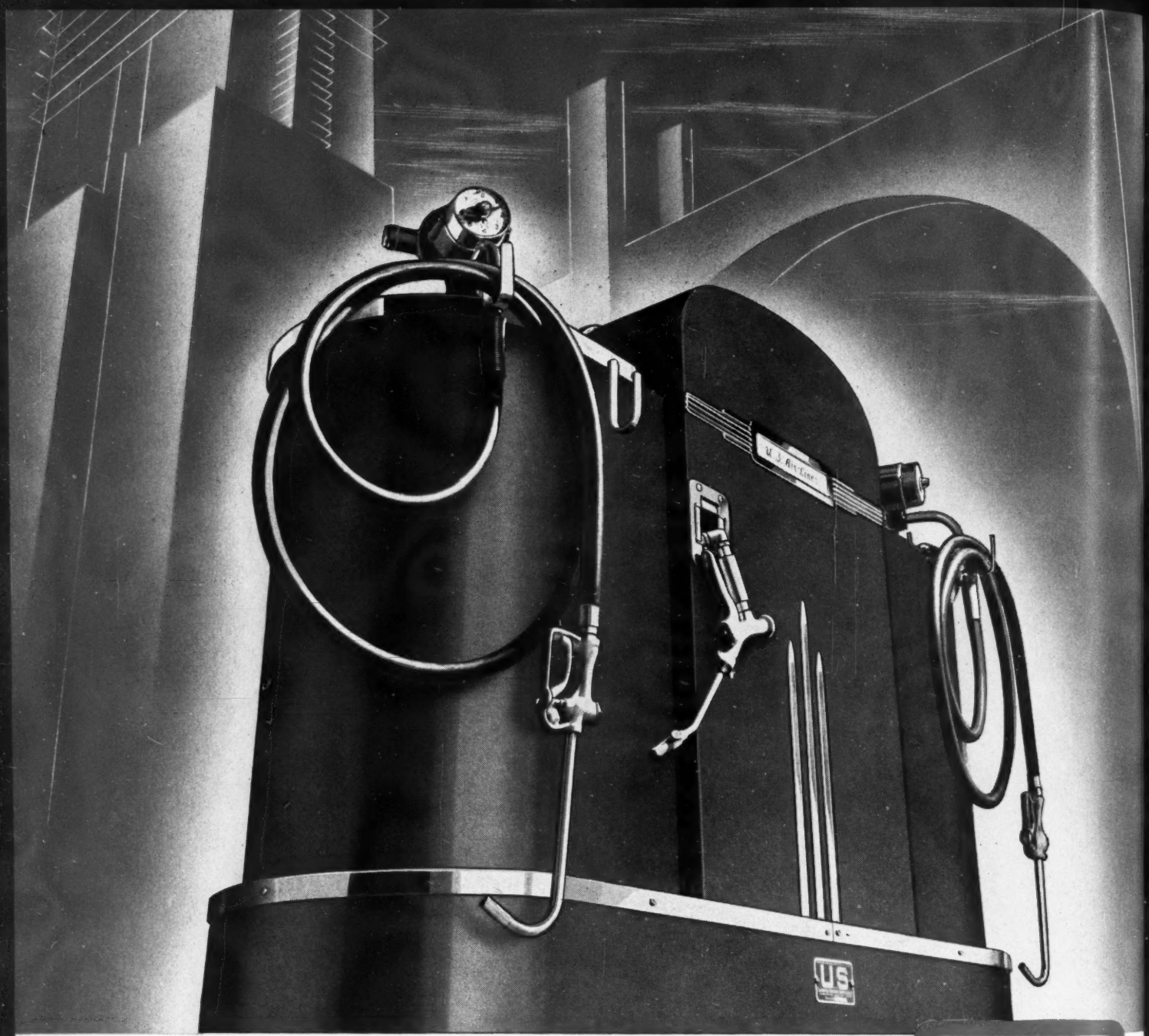
MOTOR AGE

CHILTON PUBLICATION
DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

FEBRUARY
1939

IN THIS ISSUE

Assen Jordanoff, airplane pilot and engineer, who claims to have discovered a method of making gasoline non-inflammable. Another picture and more information will be found on page 33.



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FEBRUARY, 1939

SHOP TALK

Picture

To get a picture of the business your shop is doing, it is necessary to keep a set of books and study not only the final profit or loss statement, but also the individual figures so as to see just where each department is heading. In that way you will soon know which departments need added attention to bring them into the profit column. Jack Beater, who runs a shop of his own in Fort Myers, Florida, has a few words to say on this subject in the article "Tune-up or Shut-up." It's worth reading a couple of times.

Zippers

Judging by the number of letters I have received during the last few months asking for help in overcoming transmission trouble, I think it would be a swell idea if the car manufacturers would put zippers on the transmission case so that they could be opened up easier. However, I suppose repair men should be mighty glad that modern transmissions don't stand up the way the old spur gear units did as it makes more work for the shop.

Down Under

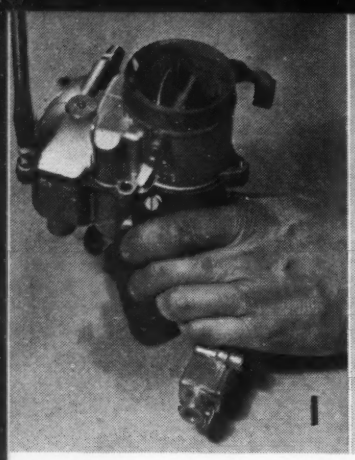
New Zealand's T. P. Ryan likes the Clearing House, especially when there is an argument going such as we had recently on timing engines. Well, why not start one, Mr. Ryan? I did what I thought was my part in the article "Gunning For Trouble With Gages," which appeared in the January issue. But evidently I just laid an egg, for here it is the 20th of January and not a single argument.

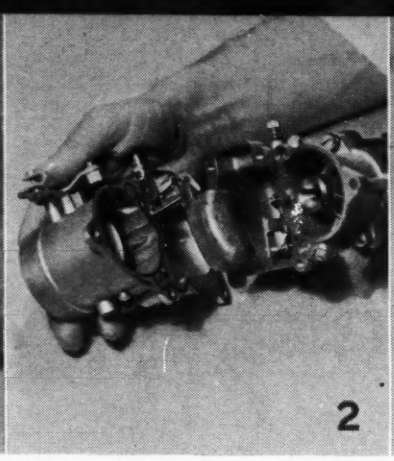
Argument

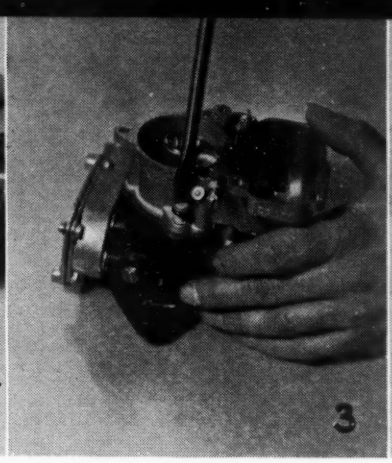
While to date I haven't started any argument with the article "Gunning For Trouble With Gages", the picture story on servicing the Ford V-8 distributor by Bob Turner, seems to have done a little better, for this morning's mail brought in an epistle from Vet of the Zvet Garage, Detroit, in which he declares in stentorian tones that Bob Turner certainly stuck his neck out. For authority he refers me to the August 1934 issue of the Ford service Bulletin and indicates the paragraph which states that "it is necessary to space V-8 breaker points and time distributor with the coil in place."

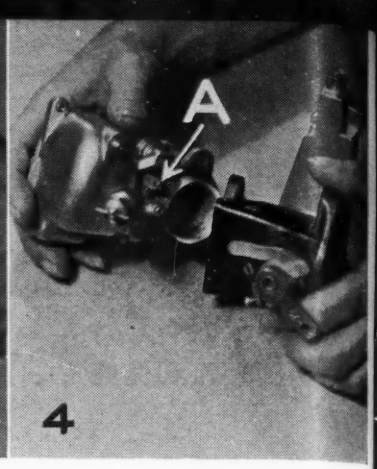
OK Vet, but let's take a look at page 11, subject No. 121151, bearing the date of April 15, 1938 (Ford Service Bulletin) where it gives the spacing for the 40-12127-B distributor as .012 in. to .014 in. This checks with the dope given by Bob. However, I must agree that a better setting is obtained, with the coil in place and the setting done on a test set or synchronizer. I would like also to point out that the article was designed primarily to show the step by step procedure in disassembling the unit.

Bill Toboldt







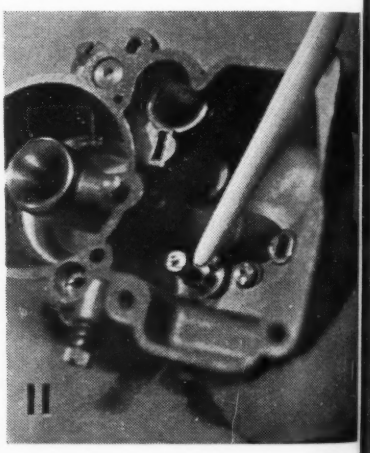


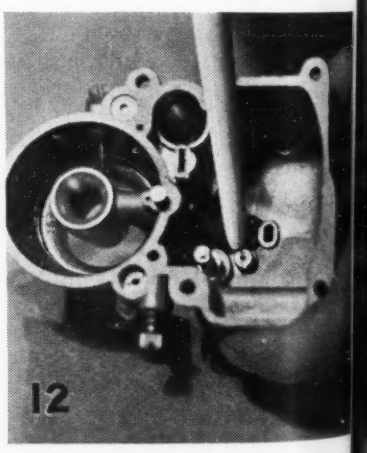
Overhauling the Series

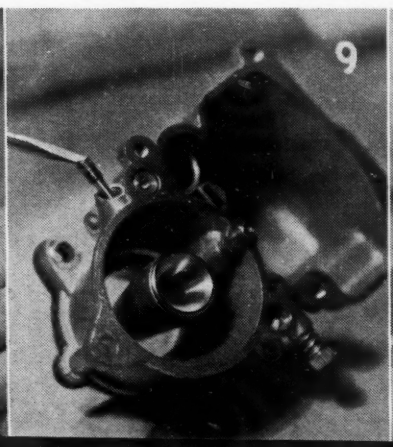
Which is used on some models of the Diamond T,

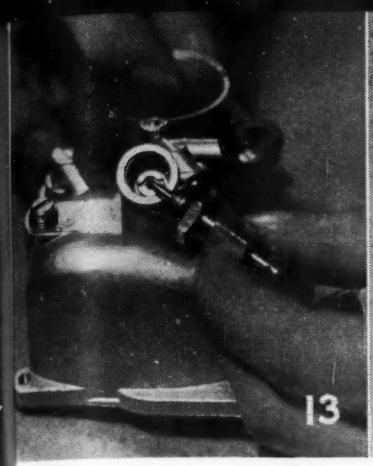
By ***BOB TURNER***

1. Remove screws holding bowl cover assembly to main body.
2. Remove bowl cover assembly exercising care not to damage float.
3. Remove screws holding main body to throttle body.
4. Separate main body and throttle body being careful to disengage accelerating pump connecting link from pump rod A.
5. Remove accelerating pump plunger and rod from main body.
6. Remove idle jet from main body.
7. Clean this passage A to idle jet thoroughly but do not remove from body.
8. Remove accelerating jet plug.
9. Remove accelerating jet.
10. Remove idle adjusting screw and spring.
11. Remove power jet valve and power jet and gasket using a long thin-walled socket.
12. Remove compensator jet and gasket.
13. Remove main jet adjustment assembly.
14. Remove the main jet.
15. Remove the cap jet base retainer.
16. Remove the cap jet calibration and the cap jet tip.
17. Examine and clean thoroughly the passages in the cap jet calibration.
18. Remove the float fulcrum pin and remove float.
19. Remove the float needle from needle seat.
20. Remove the float needle seat.





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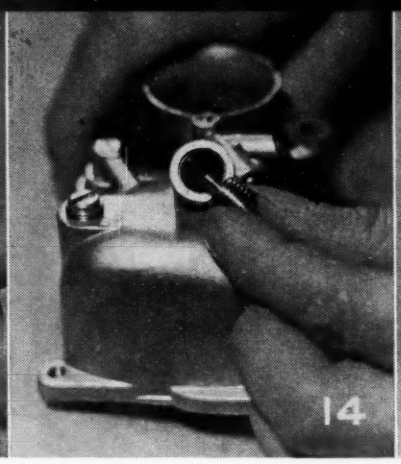
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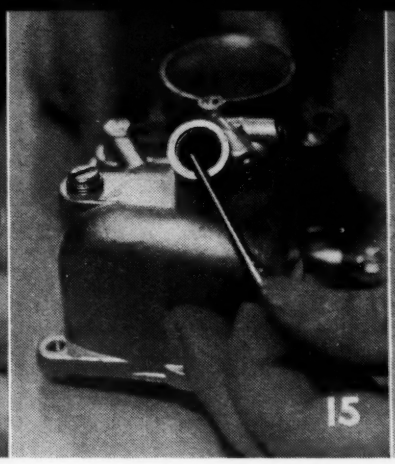
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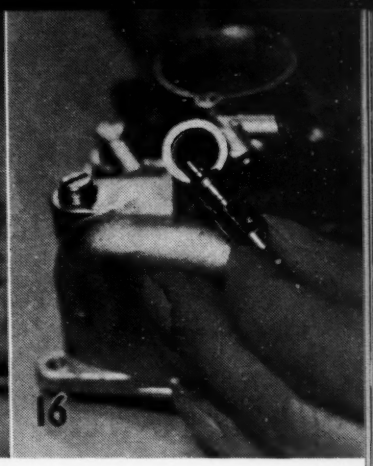
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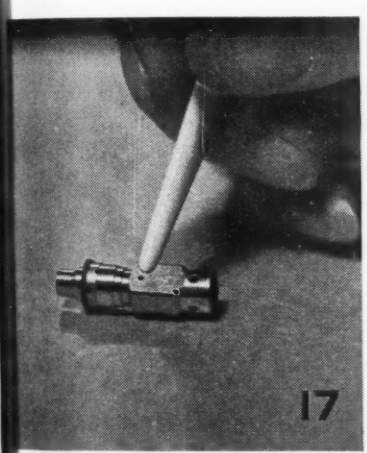
20 Zenith Carburetor

General Motors, International and White trucks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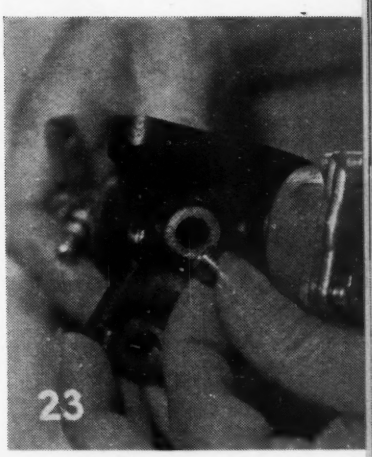
21. Remove the power jet vacuum piston assembly using a thin-wall box socket.
22. Clean out the bowl vent thoroughly.
23. Remove priming hole plug and clean.
24. Clean all passages in throttle body.
25. Measure float height by holding straight edge on float and measuring to face of bowl cover. This distance should be 1½ in. plus or minus 3/64 in.

Note: Some models of the series 20 Zenith carburetor do not have an adjustable main metering jet and have a slightly different arrangement of the cap jet tip assembly.

GENERAL: Clean all parts and passages thoroughly with acetone or gasoline and compressed air. Replace all gaskets and any parts that are worn or damaged.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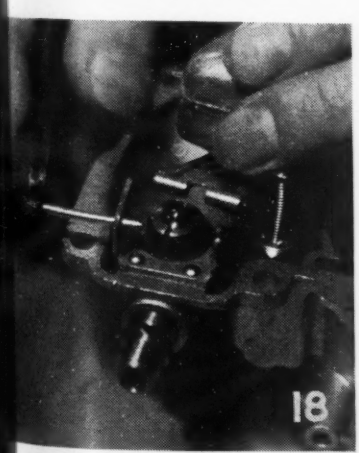
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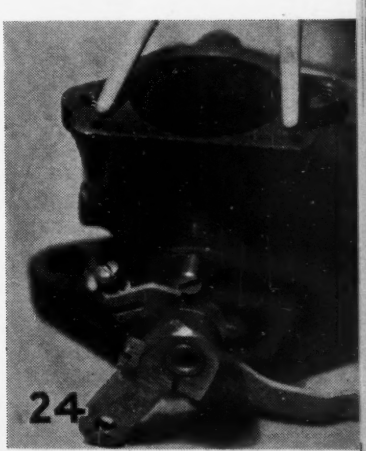
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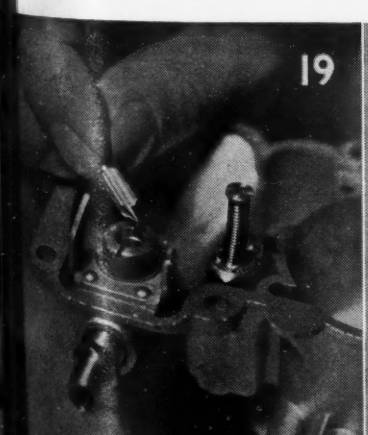
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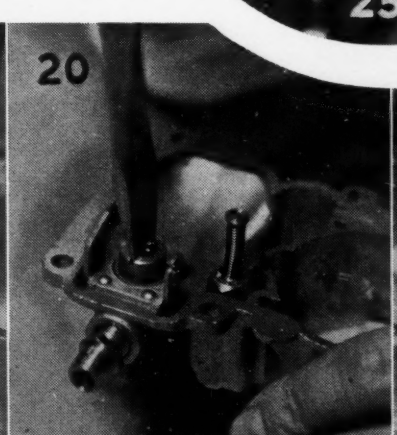
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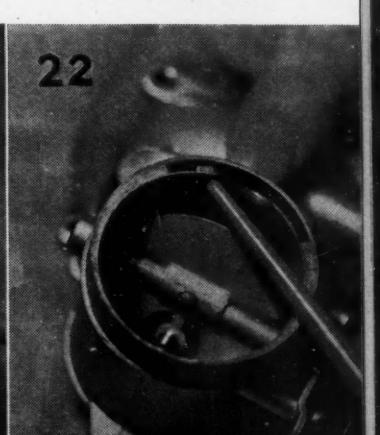
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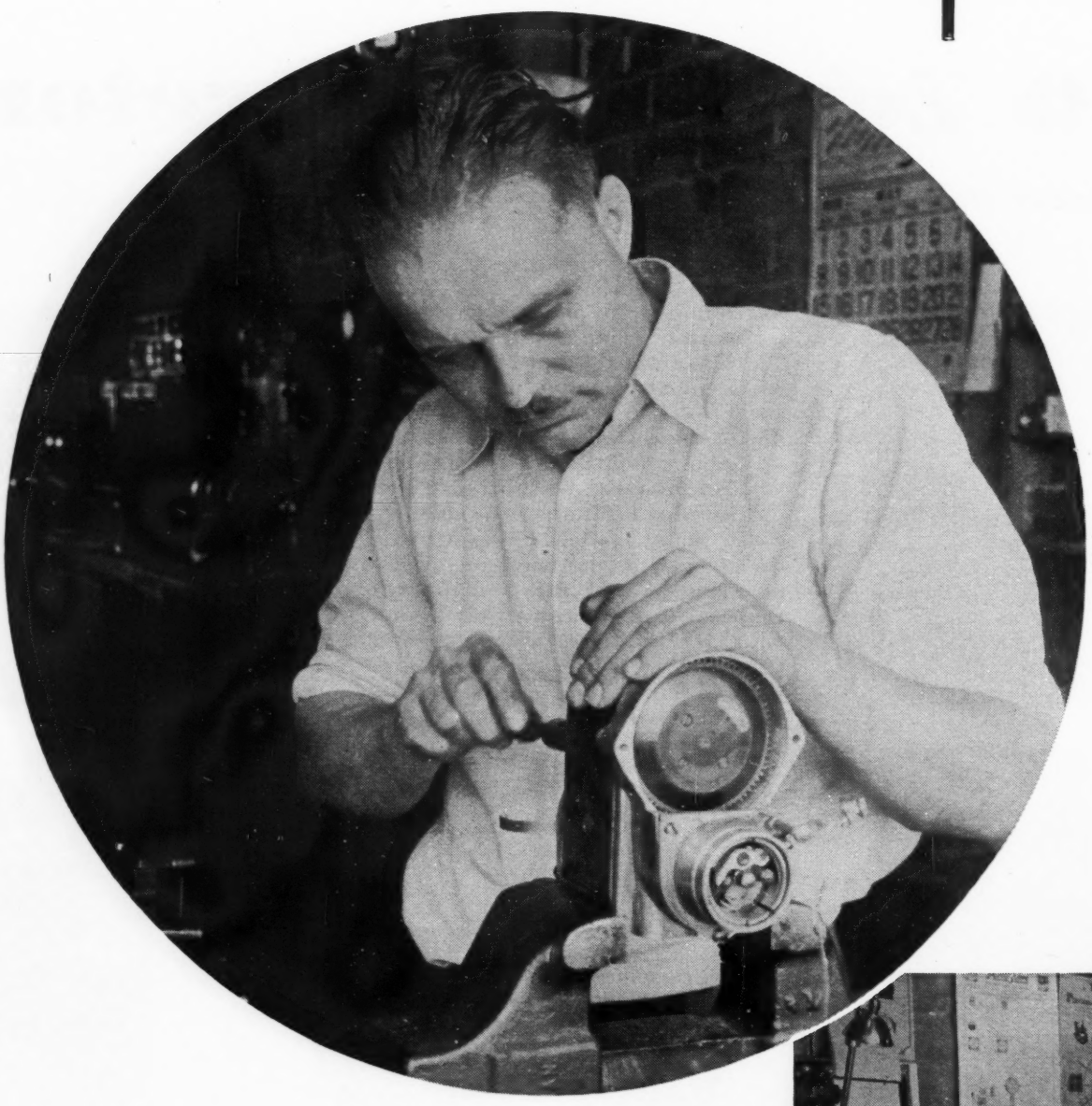
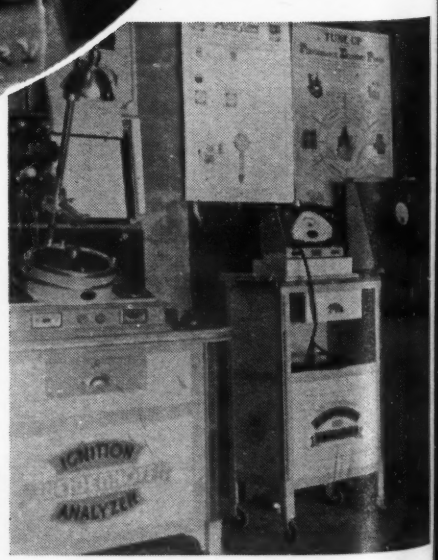
Tune Up or





Jack Beater (Circle Above) shown at work in his shop. Twenty-two years in the automobile repair business has given him a wealth of knowledge concerning the proper way to keep the customers rolling in, and in this article he passes along a few helpful pointers he has picked up along the way.

Corner of a shop (Right) that is "tuned up" for tune up jobs. A part of the shop "tune up" is cleaning and overhauling equipment to keep it attractive to the customer's eye and efficient in operation.

This automotive shop (Opposite Page) is "tuned up" to do those boring jobs and cylinder head planing. Another part of the shop "tune up" is planning for installation of new equipment necessary to keep the shop up to date and ready to take advantage of all profit possibilities.

A repairman talks to repairmen on the need of sprucing up a shop to avoid a slump and the sheriff

Shut Up

By ***JACK BEATER***

PARDON me if I seem to talk like a Dutch Uncle, but I've been in the automotive repair business longer than I like to think about. Twenty-two years as a shop helper, mechanic, electrician, car dealer, shop foreman and repair shop owner is bound to leave some indelible marks. I've literally seen hundreds of shops come and go in my time—seen them grow, flourish, prosper, then wrinkle up and die a lingering death. There's always a list of reasons behind such cases; reasons that are not hard for the *other* fellow to see.

The trouble with most repair shop operators who have failed, or who are just getting along on the ragged edge, is that they are so close to their business that they can't see their mistakes. They start out with plenty of enthusiasm, work like the very devil, and then when things get going nicely they start to coast along and end up in a rut. It's happened to me, it may happen to you. It takes a good kick in the pants every once in awhile to make us snap out of it. It oughtn't to be that way, but that's the way it is.

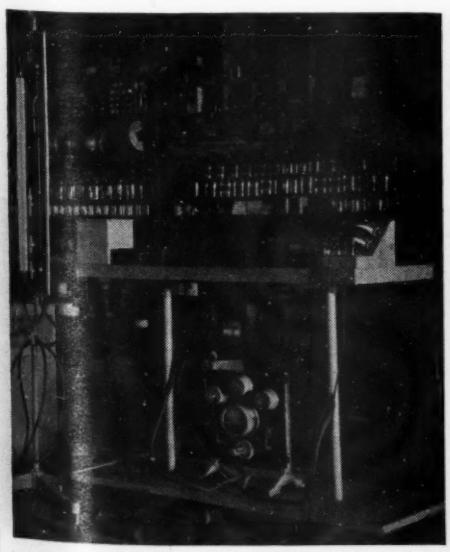
I want to tell you that a business needs a periodic tuning-up just the same as a motor does. A motor will still keep on running after a fashion even though the valves are a little leaky, the timing is late, the plug gaps have burned too wide and the carburetor thinks you're a half owner of Standard Oil. Yes, it'll keep on running for a time, but if something isn't done about it the old jalopy is headed for the junk yard.

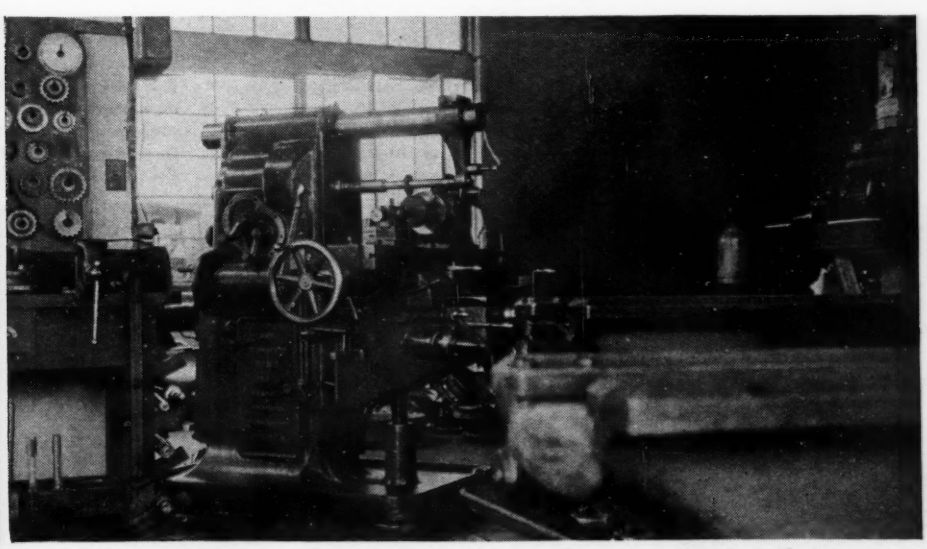
Repair shops are a good bit like motor cars in some respects. A shop will hum along smoothly when it's new, but after a few thousand days a bit of dust gathers on this piece of equipment, that one wears out, another is lost or broken. The boss starts to spend more time in the office chair, the mechanics get too familiar with the customers, the helper gets careless about cleaning up the shop, junk parts fill the corners, bookkeeping gets sloppy, accounts are allowed to drag, small parts get by without being charged for, sales efforts are only a memory, the bank account gets thinner and thinner, everybody talks about "hard times." In plain words things get in a hell of a mess.

And that's why I say that an automotive repair shop business needs frequent tuning-up. We haven't any monopoly on this; even the largest corporations get in ruts and have to be tuned-up—they call it reorganization—but it's the same thing. We have to get those old accounts straightened up, we have to get out and drum up work for the shop, we have to overhaul the shop equipment and add enough new pieces to bring things up to date, we have to clean up, paint up, the boss has to get his own hands dirty, the shop force has to be inoculated with a shot of pep, and the bookkeeper—well, maybe we'd better fire her and get a brunette the next time.

When you tune-up a motor the carburetor and the distributor have to work together or it's no soap. They have to cooperate to get the power. If your business is arranged in departments each one has to pull for all the rest if you expect to make the grade. Suppose you have gas pumps and a lube rack out front. Are your front end attendants doing all they can to put on a good show and sell the rest of your services? Are they taught

(*Continued on page* 46)

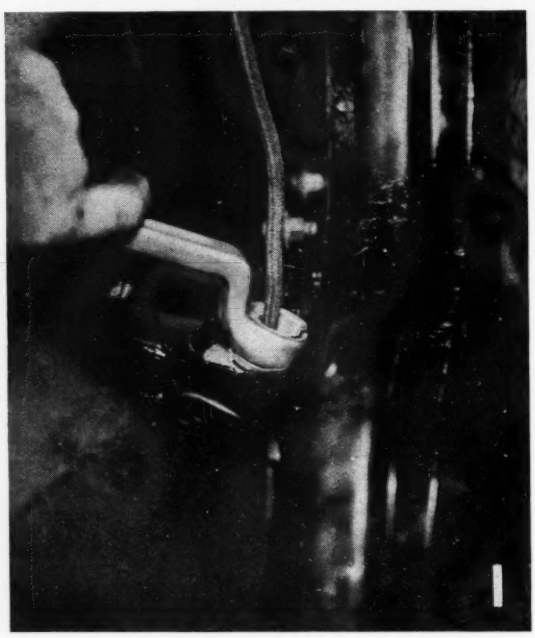




1. Packard — Use split 12-point socket or open end wrench. Loosen lock nut beneath fender and aim complete lamp; tighten lock nut.

2-3. Graham — Turning the adjusting screw located in the center beneath the lens tilts the reflector up or down to raise or lower the beam. Remove the chrome side plates to uncover the screws which control the right-to-left movement of the reflector.

4-5. Cadillac and La Salle — Up-and-down movement of the reflector is controlled by a screw located in the under side of the headlamp body. Right-to-left movement is controlled by a screw located in the radiator side of the headlight body, covered by a snap-in button.



Adjusting the

—means aiming the beam and here's how.

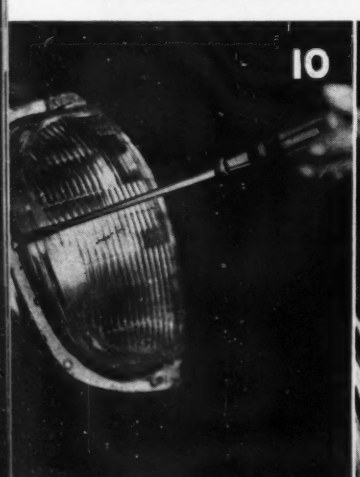
By ***BOB HANKINSON***

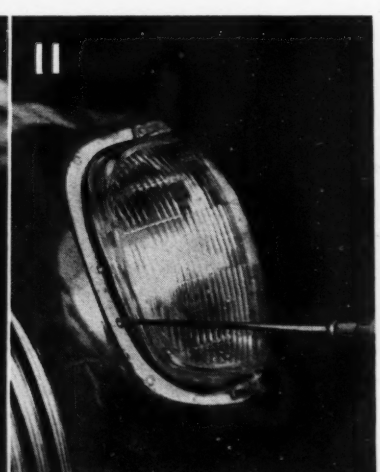
EACH year finds the new cars designed with increasing emphasis upon trouble-free performance. Those parts of the car which require maintenance attention are being designed so as to simplify the service operation as much as possible. This is particularly true with headlights. Adjusting the lights is now a simple matter of aiming the beam.

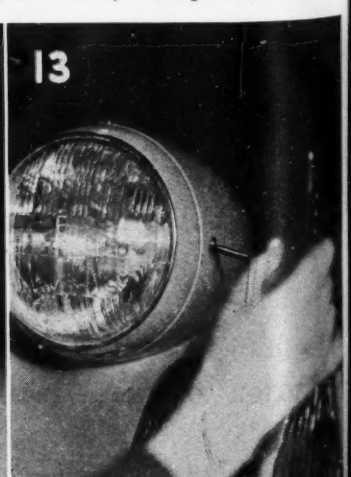
There are two general classes of headlights, those used on General

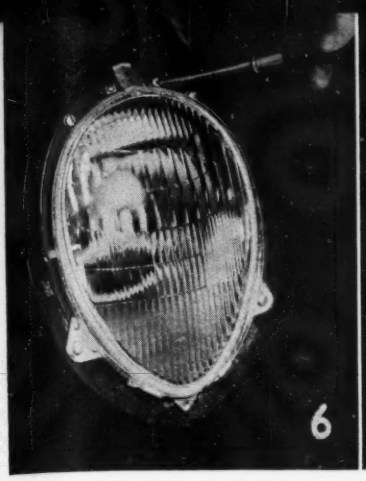
10-11. Nash —Remove headlight rim. After removal two adjusting screws will be found located on radiator side of lens. Upper screw controls up-and-down movement of reflector, and lower screw controls right-to-left movement of reflector.

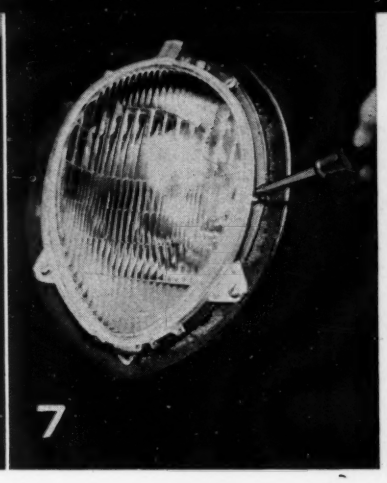
12-13. Chevrolet, Olds, Pontiac, Buick—Up-and-down movement of the reflector is controlled by a screw located in the under side of the headlight body. Right-to-left movement is controlled by a screw in the radiator side of the headlight body, covered by a snap-in button.







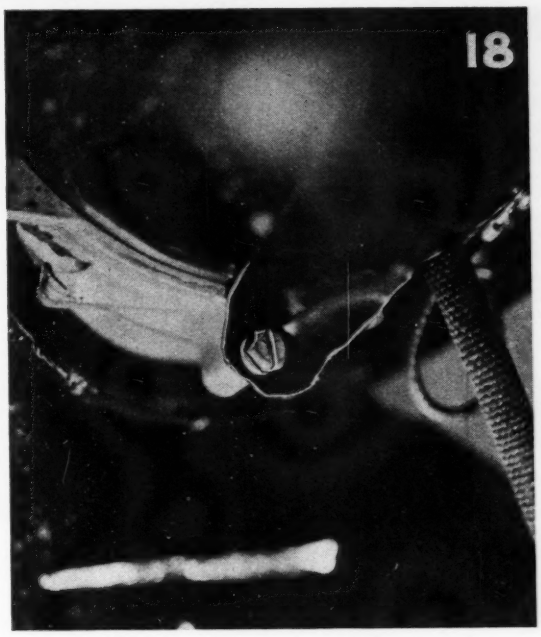




6-7. Ford and Mercury — Remove the headlight rim. Adjusting screw at the top controls the up-and-down movement of the reflector. Adjusting screw on the side controls the right-to-left movement of the reflector.

8-9. Lincoln - Zephyr, Studebaker — Remove the headlight rim. Adjusting screw at the top controls the up - and - down movement of the reflector. Adjusting screw on the side controls side adjustment.

18. Overland—Headlamp body retained in fender by a metal band and clamp screw. Turn the front wheels in toward the frame to permit reaching under the fender. Loosen the clamp screw and aim the lamp.



Motors cars which are provided with adjusting screws reached through openings in the lamp body, and those used on the Chrysler lines as well as Ford, Studebaker, Hudson and Nash, which require removal of the headlamp rim to provide access to the adjusting screws.

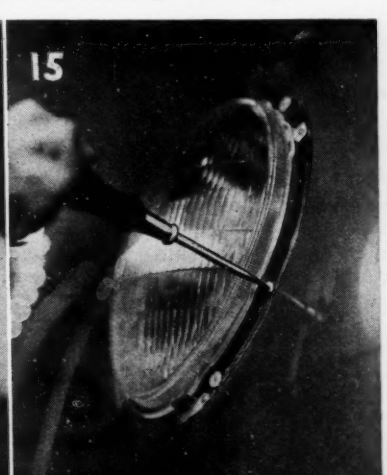
Packard and Overland present individual types, the adjusting procedure for which is clearly shown on these pages.

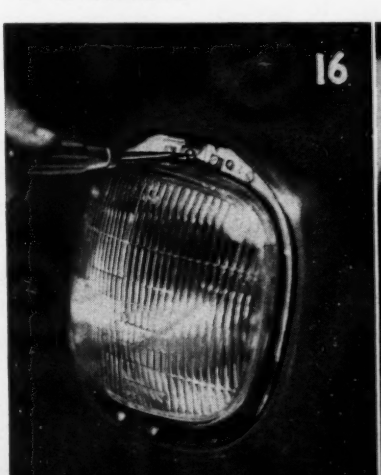
1939 Headlights

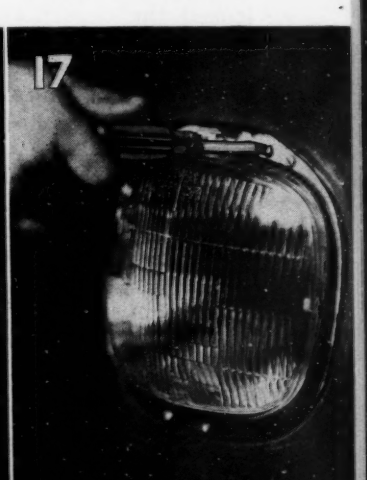
Most cases require removal of headlight rim

14-15. Hudson—Remove the headlight rim. Adjusting screws, one on each side of the lens, are identified by letter "V" for vertical movement of the reflector and "H" for horizontal movement, stamped in the headlight body retaining rim. The Hudson 112 follows the same procedure as last year, by loosening a lock nut on the inside of the radiator grille and aiming the lamp.

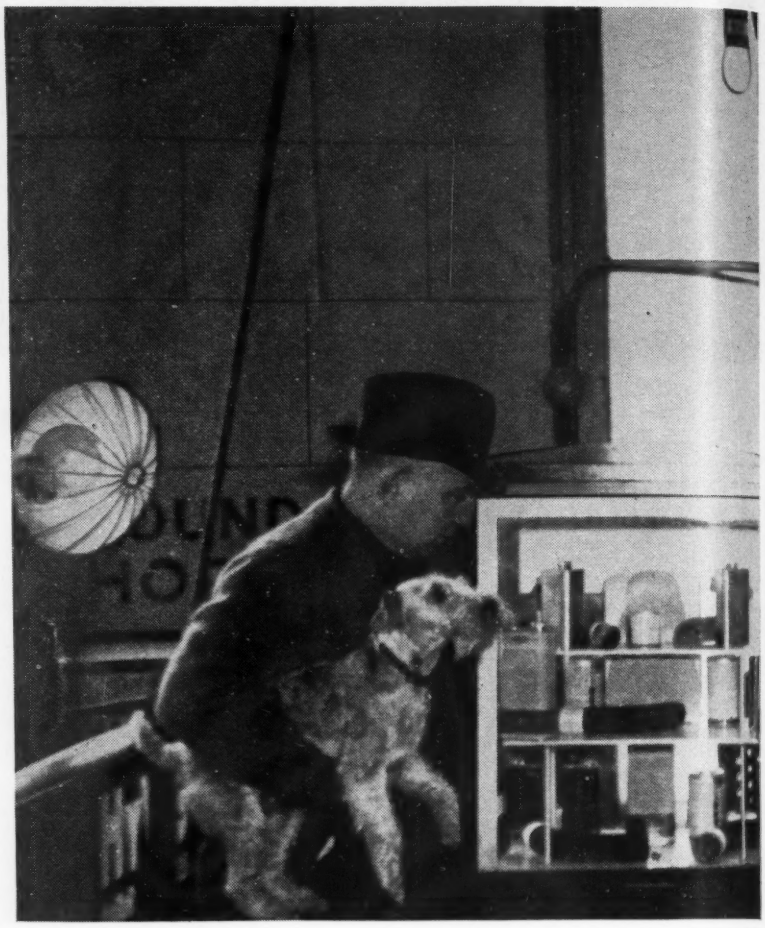
16-17. Plymouth, Dodge, DeSoto, Chrysler —Remove the headlight rim. Adjusting screw located above the lens and beneath the headlight rim retaining bracket, controls up-and-down movement of the reflector. Adjusting screw located above the lens but to the right of the center, controls the right-to-left movement of the reflector.







(Above) Behind this massive display of accessories is the garage office. (Below) Seven different brands of canned oils, three makes of batteries and a stock of tires are displayed neatly.



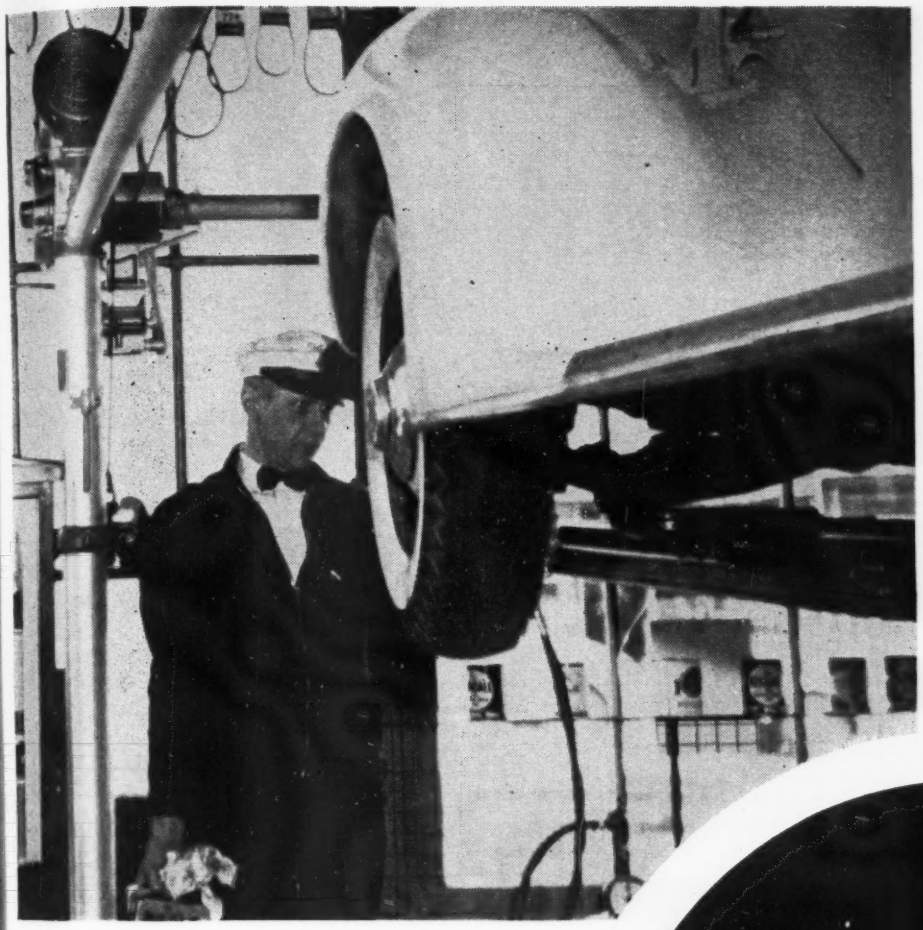
Live Storage That's Really A

The Sutter-Larkin Garage boosts income from storage by aggressive merchandising

WHEN R. B. Court opened the Sutter-Larkin Garage in a high-rent down-town district in San Francisco, Cal., he realized that he could not depend on car storage alone to make it pay. Although this garage now operates to full capacity of storage for 165 cars, the enterprising operator has not overlooked the opportunity to develop extra business in sales of accessories and mechanical service, which now bring approximately $1,000 a month—half the monthly total!

This busy garage does a monthly dollar volume of $2,000. However, more than 10 per cent of this total is derived from the sale of accessories. Another 25 per cent is derived from shop service, grease and oil, and headlight testing. Other services bring up the total. One relatively small item, battery charging, brings in enough money to pay the light bills—it is one of the best lighted garages in San Francisco. Among other things, the Sutter-Larkin Garage furnishes a "wipe-off" service to owners who store their cars regularly. For a monthly fee of $2.50 the car is cleaned daily, being wiped outside and inside—a service that is now used by at least 25 car owners and brings in a monthly revenue of $62.50.

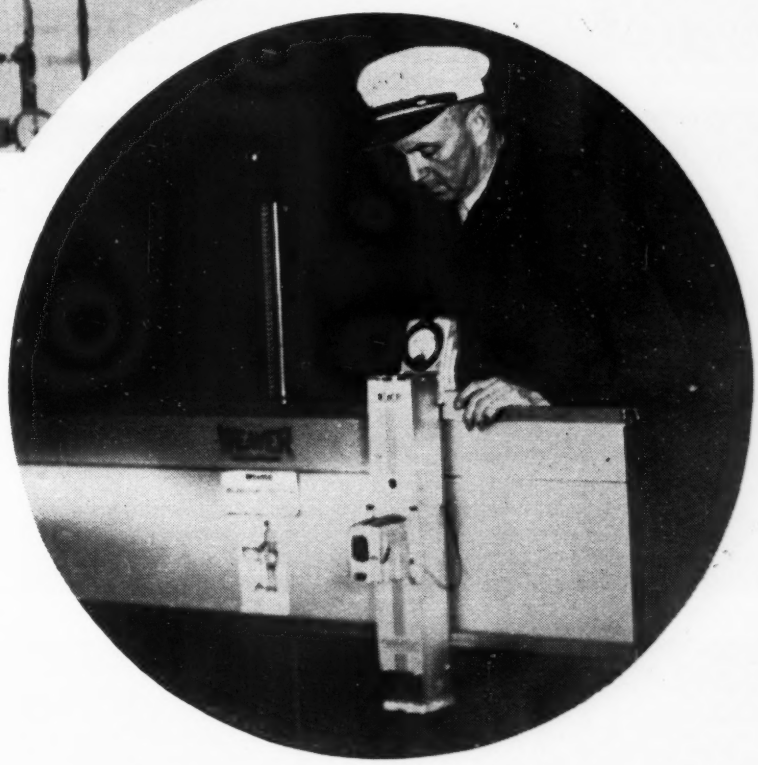
Located on a busy corner, this garage sells 9000 gallons of gas a month. But it doesn't overlook the possibilities of promoting sales of batteries, tires and other items, which help to boost the monthly income. Recently Mr. Court conducted a drive on batteries. In two weeks he sold no less than 80 batteries. This was done simply by testing the battery in every car stored in the garage. A notice was put on the windshield, informing the owner of the results of the gravity and voltage tests. Where replacements were needed Mr. Court and his assistants suggested them to the owners, but no high pressure salesmanship was used. However, a good stock of batteries was kept on hand to impress the owners.



By
J. K. NOVINS

(Left) Displaying accessories near the grease lift is an idea effectively used to increase sales. This type of display has helped the sale of fan belts, radiator hose and cleaning compounds.

(Below) R. B. Court, operator of the Sutter-Larkin Garage, shown operating the headlight tester. Used primarily as a service accommodation for customers, the modern equipment has resulted in much good will and in many sales of lamps and other lighting equipment.



y Alive

"It may be interesting to note that for every hundred batteries we tested in this manner we made at least ten sales," says the garage operator. "We consider this a good record, particularly as we gained the goodwill of the owners by giving them the free testing service. We earned some additional revenue by recharging run down batteries.

"There is one thing to be said about our policy of pushing sales of accessories. We go at this business in the spirit of giving our customers every accommodation instead of merely trying to sell them something. Let me give you just one illustration of how this works out to our advantage. Some time ago we purchased a Weaver headlight tester. It is a pretty expensive piece of equipment, but although we do not get much headlight testing business in this garage it has more than repaid the cost by cultivating the goodwill of customers, and incidentally has helped the sale of lights and other accessories.

"Frequently car owners drive up with tickets in their hands because their lights are out of focus. They are axious to have their lights adjusted so that they could be on their way without delay. We keep the tester in front of the garage ready for immediate use. The equipment is wheeled up to position wherever the car is parked and the adjustment made without any delay whatsoever.

"For the accommodation of customers we stock at least seven different brands of canned oil. These are displayed in a special section in the front part of the garage, where the cans are displayed on metal shelves which we had built especially for us. In the same section we also display three different

(Continued on page 73)

Mileage

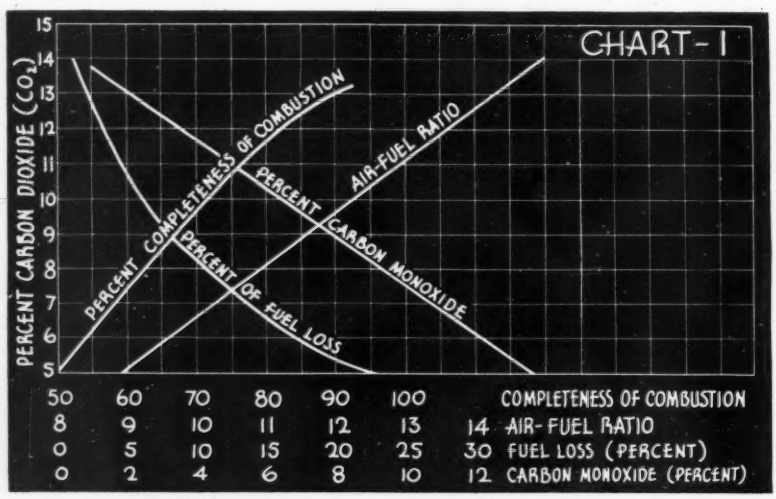
A discussion of many

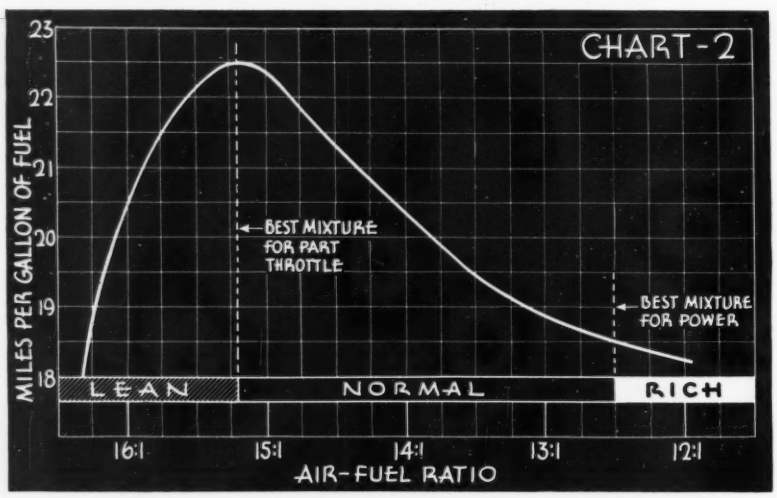
By BEN IKERT

JUST about all customers want the most gasoline mileage for their money. But we must look beyond the immediate problems surrounding the carburetion of fuel as there are many things that affect mileage. There probably are fifteen or twenty things that directly affect getting the most from gasoline dollars and each must be carefully checked in order to get the most economical performance.

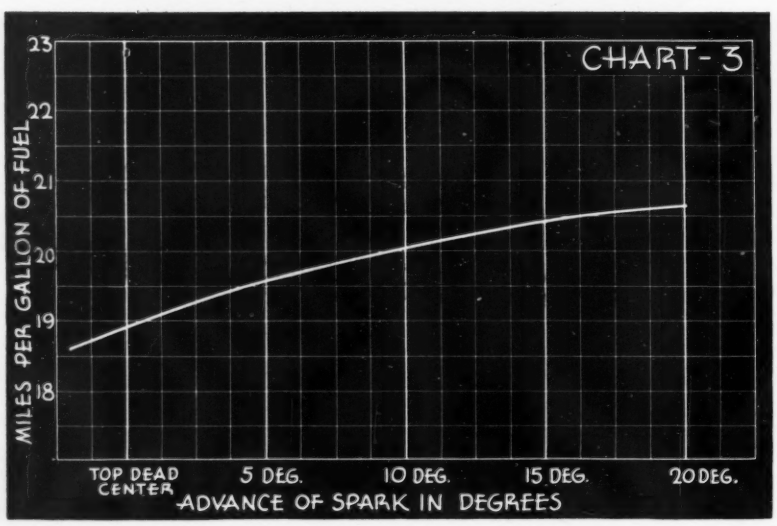
First of all, the gasoline is important. There is little to be feared if gasoline is bought from a reputable refiner so long as it is fresh and dispensed through the accepted channels of distribution. The higher the octane rating of gasoline the better performance to be expected. Commercial gasolines are

1. The per cent of fuel loss becomes less the greater the completeness of combustion.





2. This chart shows the relationship between miles per gallon and air-fuel ratios.



3. The correct point of firing the charges in the cylinders (spark advance) has much to do with getting maximum fuel mileage.

4. The car owner pays for high speed driving in fuel. The area between the power mixture and light load mixture curves represents the saving of the carburetor "economizer" action.

5. Curve 3 was obtained by properly tuning the engine. The dips A and B were caught by incorrect relationship between the throttle and idling system and the metering rod lifting out the metering jet too soon.

for Their Money

of the factors entering into good gas mileage

blends of hydro-carbons which range from very volatile ones to heavy ones. Refiners balance these so that there are enough light or volatile "fractions" to insure easy starting and enough "heavy fractions" to keep down evaporation. Correctly balanced gasoline is said to be "stabilized." This means that all undesirable constituents are eliminated or kept to a minimum and only those things included that insure smoothness, power, acceleration, easy starting, low vapor pressure (to prevent vapor-lock, which interferes with the normal flow of gasoline in the fuel pump and fuel lines) and maximum economy.

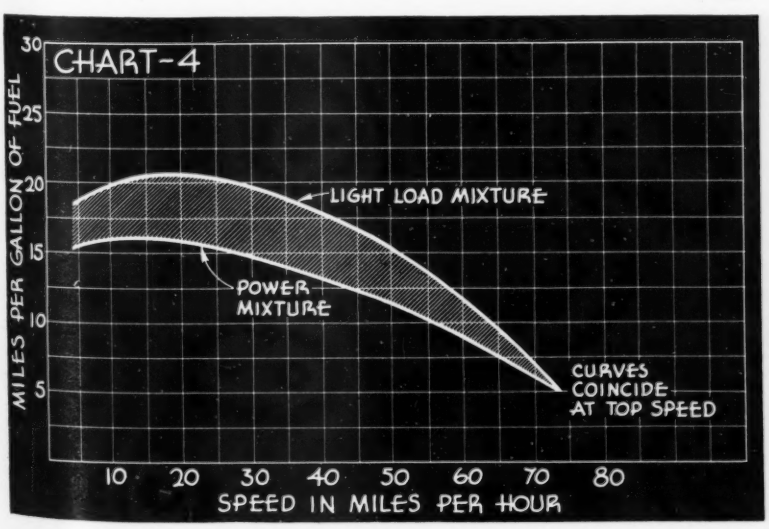
If the carburetor is up to standard in every respect and correctly adjusted it automatically delivers to the engine the correct mixture of air and fuel for idling, low-speed and high-speed operation. Exhaust gas analyzers quickly show this.

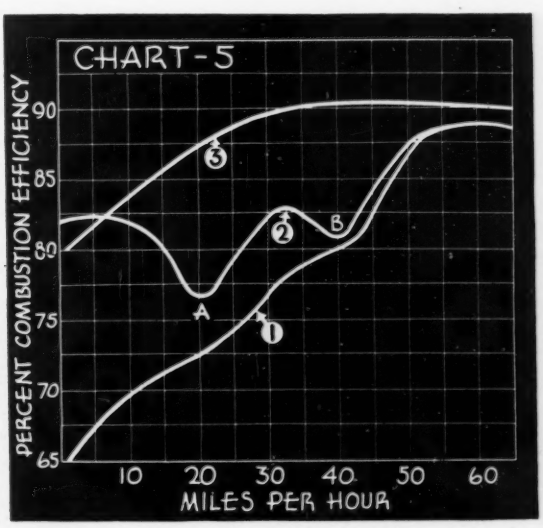
The carbon dioxide content of the exhaust is related directly to the air-fuel ratio entering the carburetor. Laboratory tests show that the difference between the mixture ratio as indicated by an exhaust gas analyzer and the ratio as obtained by actual measurement of the gasoline and air entering the intake manifold of the engine, averages less than 3 per cent. The chart, Fig. 1, shows that there is less fuel loss the greater the completeness of combustion and also the per cent of carbon monoxide becomes less.

To get the best gasoline mileage for customers, the service man must consider three things—compression, ignition and carburetion. No amount of adjustment in either ignition or carburetion, or both will have a marked effect on gasoline mileage and good performance generally, if the engine compression is low. The higher compression ratios of modern engines must be maintained if maximum miles per gallon are desired. Increased compression pressures also produce higher speeds with less throttle opening. It means the engine runs cooler because more of the heat is turned to useful power and not wasted in the exhaust or cooling system.

But all the benefits of high compression are lost if the valves do not seat tightly, usually due to gum formations of the valve stems, or if the piston rings are excessively worn. A compression test of each cylinder should be made as a check

(*Continued on page* 58)





"It's a habit, I guess—Since Bill's worked at the garage he won't use towels!"

Legally Speaking

By

C. R. ROSENBERG, Jr.

Each month MOTOR AGE will present on this page a lawyer's interpretation of Federal and local court decisions of interest to repairmen. A knowledge of how the law regards these various situations may help you keep your shop from being on the wrong end of a lawsuit some day.

State Wage-Hours Laws

Independent repair shops doing the greater part of their business within the boundaries of one state are exempted from the requirements of the Federal Wage-Hours Act, but if a movement now under way is successful, these local business men will not be free from wage and hours regulation very long. A strenuous effort is being made to have the legislatures of the various states pass state laws imposing on retail and other local businesses wage and hour regulation similar to that of the Federal Act.

The pressure for this wage and hour legislation in the states is said to be coming from labor unions and from interstate industries subject to the Federal Act. In many instances these interstate industries find themselves in competition with local industries not subject to Federal regulation. It is urged that competing industries should be on the same basis so far as wages and hours are concerned. The danger is that state wage and hours laws aimed at such an industrial situation may impose an undue burden on retailers and other local businesses.

Repairmen and other local business men will do well to see that their interests are properly represented when these proposed state wage and hour laws come before the respective legislatures for consideration.

Poor Lighting Expensive

Saving a few pennies on a repair shop light bill may cost thousands of dollars. Poor lighting recently cost a store owner $3500.00 plus legal expenses. At least, according to the facts of the case, poor lighting of the store was a major factor.

A woman customer making her way down the stairs in the store, fell and was severely injured. It appeared that the heel of her shoe was caught on a step, and she was thrown backward.

Of course a loose heel, a careless footstep and many other causes might have contributed to such an accident; but here is what the Federal court said in its review of the case:

"The negligence charged is that the stairway was insufficiently lighted and improperly constructed. There was evidence that the stairway was not well lighted, either when she ascended the stairs or when she returned, and also that the construction of the steps was somewhat unusual in that the treads were slanted downward somewhat more that the usual slight angle; and that the height of the steps was not uniform. The fall took place as her foot was placed upon the second step from the top."

These allegations were contested by the store, but at any rate the jury believed the customer's story about poor lighting and badly constructed steps and brought in a verdict of $3,500 against the store.

Employe's "Helper"

The legal and financial danger in which a repair shop owner may become involved when an employe engages a "helper" is illustrated by a recent court decision.

The driver of a truck arranged with a fifteen year old boy to help him with certain deliveries. The driver promised to pay the boy for his services. While thus engaged in helping the driver, the boy was injured and later brought suit for his injuries against he driver's employer.

The employer urged that under the circumstances the boy might be considered an employe and therefore covered by workmen's compensation insurance which the employer carried. The boy's remedy, it was urged, would therefore be under the workmen's compensation law and not in a damage suit against he employer.

Under the circumstances, the court said, the boy was neither a trespasser, a volunteer nor an employe, but was on the truck by "sufferance" and was therefore entitled to be protected from the negligence of the driver. A verdict of $1,000 against the company was sustained.

Such cases indicate the advisability of forbidding employes, particularly truck drivers, from allowing other parties to assist them with their duties or to ride on the employer's truck.

The placing of "No Riders" signs on the truck may be helpful to the employer to the extent that a person riding on a truck carrying such signs does so with the knowledge that his being on the truck is contrary to the employer's rule. The Ohio court put it this way:

"It seems reasonable to hold that one who has knowledge of an express rule of the employer prohibiting its drivers employing assistants in the performance of their services but nevertheless persists in accepting such employment with full knowledge of the rule, would thereby place himself in the position of a trespasser."

What Is Fraud?

The term "fraud" is often loosely used, but in law it means a transaction containing certain very definite elements. Where fraud is found by the courts it is generally in connection with a sale or a contract and includes:

A false statement of a material fact connected with the transaction made with the intention that the other party shall act upon it;

Belief in the false statement by the other party, who acts upon it accordingly and suffers financial or other damage as a result.

Some courts have said that where a person seeking to induce another to enter into a deal, makes a statement without knowing whether it is true or false, he is just as blameworthy as if he had actually known the statement was false when he made it. This view of the courts is, of course, intended as a check on reckless statements in business transactions. Which suggests that unreliability or irresponsibility may be just as bad as downright crookedness.

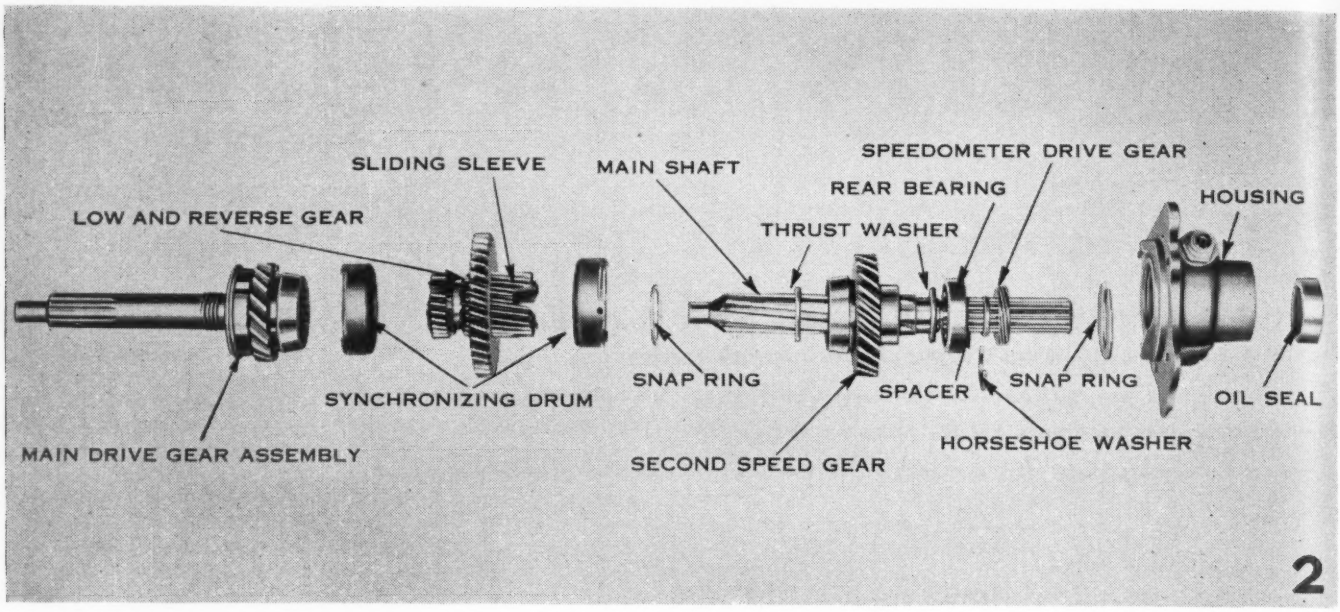


Fig. 2. Details of transmission main drive shaft

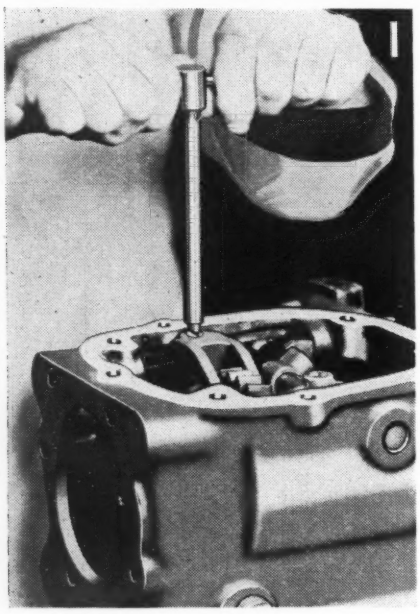


Fig. 1. Removing shifter rail lock screw

Servicing the

Describing the Olds factory method of

THE Olds factory official method of disassembling and reassembling the 1939 Olds transmission is as follows: Disconnect the lower control rod at the transmission and then the selector cable from the transmission cable anchor bracket. Then unscrew the cable from the end of the selector shaft and remove the selector shaft lever and helper springs. The order in which these parts are removed is important so as to prevent damage to the selector cable. Also, these parts must be assembled correctly to avoid the possibility of kinking the selector cable.

The next step is to remove the transmission, the transmission cover and the speedometer driven gear. Then remove the four cap screws which hold the transmission rear bearing housing assembly. Shifter forks and selector shaft cams are then removed by taking out four set screws, Fig. 1.

Remove selector shaft and shifting cams by pulling selector shaft from side of case. Do not let cams drop into case. Note that the second and high speed shifter cam is shorter than the low and reverse cam, also that the second and high shift rail is shorter than the low and reverse shift rail.

Next remove the shifter rails and forks. As the poppet springs and balls are underneath the shifter rails, care must be exercised to avoid losing them by removing the rails from the front end of the case.

The low and reverse gear and sliding sleeve are next removed, then the countershaft which is pushed out of the rear of the case.

After removing the main drive gear snap ring, remove the cluster gear. Next take out the idler shaft lock screw, the idler gear and shaft. If the selector shaft oil seal is defective remove it, otherwise leave it in place, as removing the seal will necessitate its replacement.

This completes the disassembly, and the parts are reassembled in the reverse order. To disassemble transmission rear bearing housing assembly, remove second speed synchronizing drum by prying ring over shoulder on second speed gear. Remove second speed gear snap ring Fig. 3. When it comes to

(Continued on page 48)

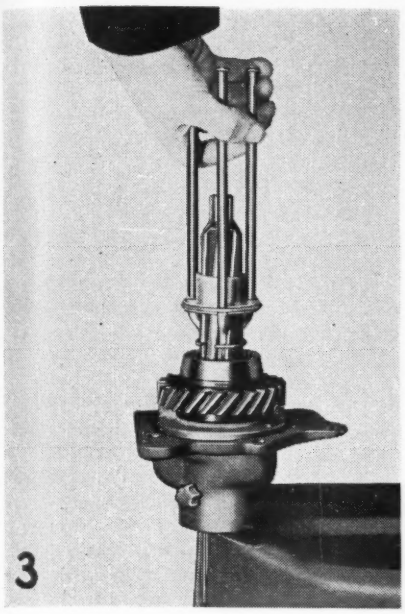


Fig. 3. Removing second speed gear snap ring

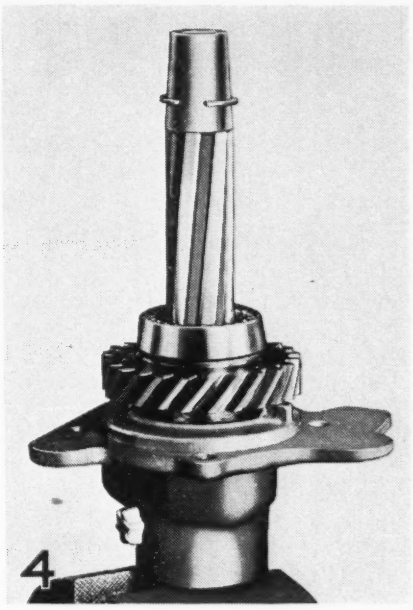


Fig. 4. Replacing second speed gear snap ring

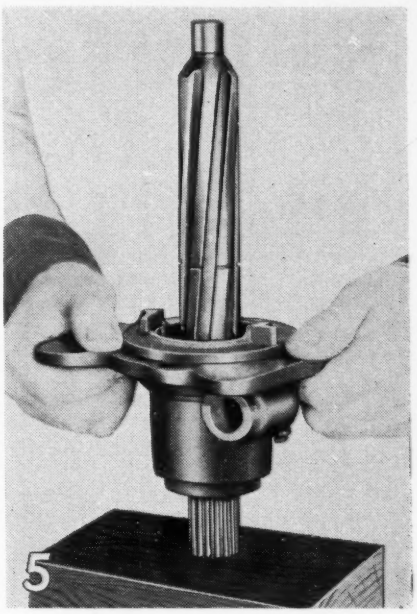


Fig. 5. Removing transmission main shaft and bearing

1939 Olds Transmission

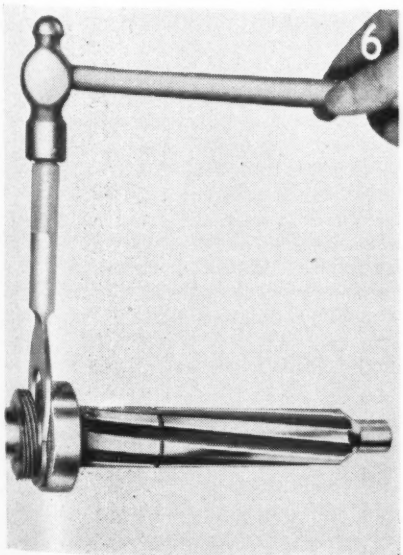
disassembling and reassembling the unit

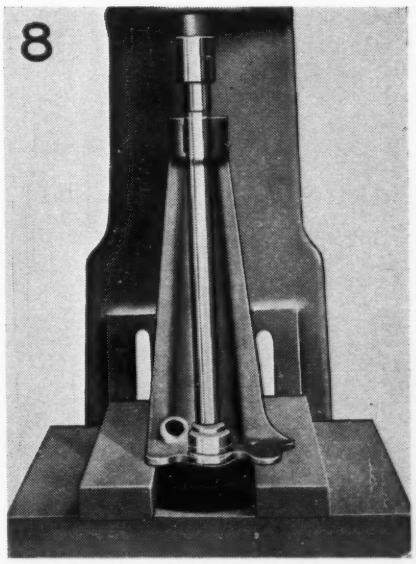
By ***BILL TOBOLDT***

Fig. 6. Removing transmission rear bearing snap ring

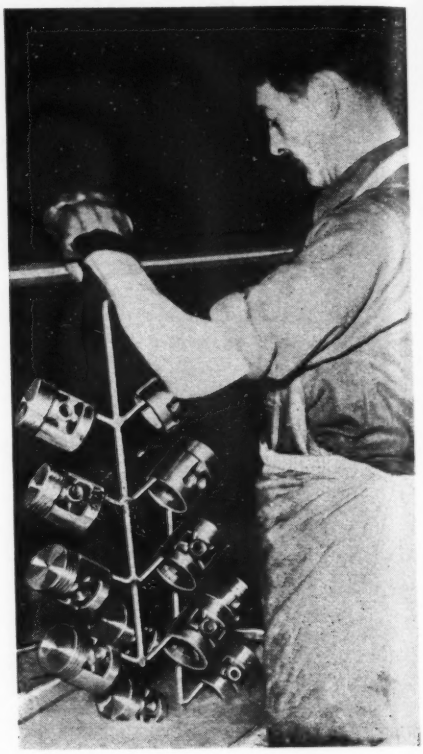
Fig. 7. Installing rear bearing oil seal.

Fig. 8. Removing rear bearing housing bushing





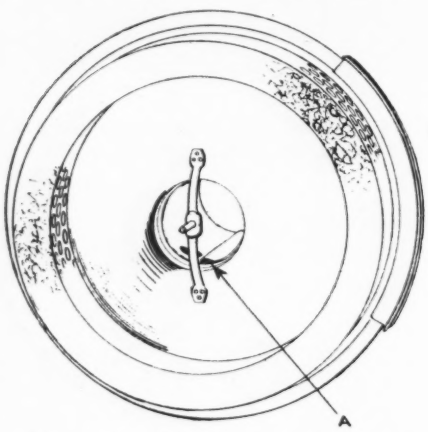
Service Hints from The Factories



Pistons of Dodge engines are tin-coated at the factory by a chemical process. The process comprises a series of cleaning and rinsing stages and includes the precisely controlled immersion of the previously finished pistons in a hot solution of sodium stannate as shown above. Dodge claims tin-coating of the piston adds materially to the life of the engine and to fuel and oil economy.

Air Cleaner Noise

A whistling noise noticeable at speeds of 20 to 40 m.p.h. on 1939 Pontiac engines may be caused by the inner tube of the air cleaner not fitting snugly into the outer tube. A small gap at the inner tube seam or



adjacent to the seam (see "A" in the illustration) is sufficient to cause a whistling noise as the air passes into the carburetor. The remedy for this is to close the gap with a drop of solder.

Studebaker Brake Shoe Guide Pin Washer

A brake shoe guide pin inner washer, Part No. 186273, on 1937 Studebaker models, is now available in service stock for installation as a correction for brake shoe rattle or jingle. This washer is of the special spring prong type which serves to prevent a jingle which was sometimes noticeable with the old plain type washer. The washers are the same as used on the 1938 models.

"You're too late, lady—they're closed!"

Excessive Ping on Chevrolet 1938 Carburetor 391S

To correct, service procedure is as follows:

Set octane selector to zero. Adjust distributor with neon timing light to steel ball in flywheel. Test car on road with engine at normal operating temperature. Accelerate from 10 m.p.h. with wide open throttle and observe spark ping. Advance or retrad with octane selector to give a slight ping. Adjustment can be as much as 10 deg. depending upon type or grade of fuel used and altitude of road.

After this, when accelerating from a constant speed of about 20 m.p.h. excessive ping at the start of acceleration which does not remain for entire accelerating period, is due to "time lag" of vacuum control in retarding ignition. To reduce this "time lag", remove brass fitting in carburetor body that attaches to vacuum line. On later models, opening in the body is rectangular and no adjustment should be made. In early models, opening is a small round hole. Drill first with a No. 52 (.0635 in.) drill and then with a No. 46 (.081 in.) drill.

Remove vacuum line fitting at diaphragm and drill out to No. 46 (.081 in.).

About March 15th a 3/16 in. vacuum line with proper fittings went into production instead of the ⅛ in. line. This is an improvement to cut down "time lag".

Pontiac 6 & 8—1938

The outside vent has been changed to a No. 10 drill size. This was formerly a No. 50 drill size. The change can be made when carburetors are being serviced.

Metering Rod Drag

In some instances the metering rod on the 1938 Hudson rubs against the metal dust cover. There is always a mark on the inside of the dust cover if this condition exists.

To correct this condition, remove the hair pin spring from the metering rod pin and file about 1/32 in. off the length. The hair pin can be eliminated.

Front Engine Mounting Bolts

If loose front engine mountings are encountered on Chevrolet passenger cars, check the bolt in the mounting for bottoming. If too long, cut off 1/16 in. Do not cut off more than 1/16 in. as the entire length of the threads in the mounting are necessary for satisfactory operation.

W. P. Carbon Lock Wire

When Part 393788 Water Pump Bearing Package is installed in Pontiac water pump bodies using the round carbon washer, a lock wire Part 500580 should also be installed. A few lock wires should be kept in parts stock for use as needed. The lock wire, when installed, prevents the washer from turning which will cause a squealing noise.

Noise in Inlox Bushing

If a noise should be located in the Inlox Bushing at the front of the rear springs of the Chevrolet passenger cars, the bolt through the spring hanger should be loosened and the car jolted several times. This allows the bushing to take its natural position. The bolt should then be tightened.

Don't Be Scotch..

AUTOMOBILES 8 and 10 years old are generally considered as "junkers." They are inefficient, costly to operate and in many instances are unsafe. Air compressors, of equal age are in the same class, but unfortunately, many shop operators do not stop to analyze the money that is being wasted by operating a "junker" compressor.

Badly worn rings, sloppy pistons, pitted valves, worn cylinders, wrist pings, bearings and other vital parts are just as descriptive of an old junker automobile as they are of a compressor of equal age. And just as the worn out auto requires more gasoline, a worn out air compresser takes more electric current to keep the compressor tank filled with air.

Furthermore, a compressor installed in a shop eight to ten years ago, is now, in the majority of cases, incapable of supplying the needs of the shop. When the compressor was purchased, the major need for compressed air was for inflating tires. Today, many shops have the compressed air piped around the shop where it is quickly available for cleaning purposes. In addition, it is used to operate hoists, spray guns, lubricating guns and equipment, spark plug cleaners, air filter cleaners, etc.

....With Your Air Compressors

Like an ancient car that ought to be junked a "jallopy" compressor's a drain on the purse

Test of old machines in service prove that current costs are often two to three times higher than they would be with a new compressor. In other words, a new unit would supply two to three times the amount of air at no increase in operating costs. In many instances the reduction in the electric bill will more than pay for a new compressor.

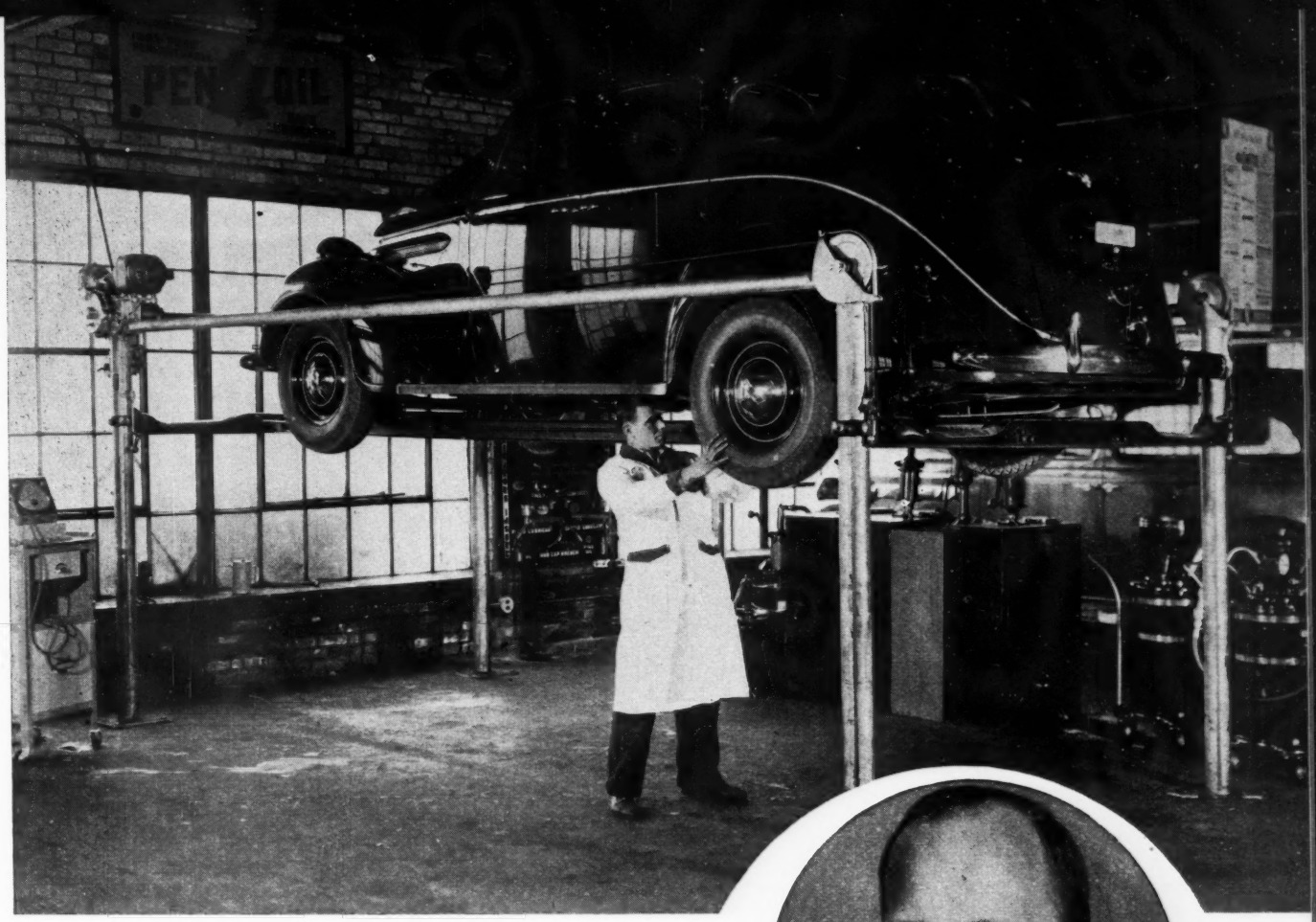
For example, the cost of operating a new 1½ hp. compressor of 7 cu. ft. capacity is approximately $51 per year if the compressor is operated on an average of two hours per day. Costs for operating a 10-year-old compressor of similar size would range from $100 to $140. Obviously the savings would be worth while and would soon pay for the new compressor. On larger machines the savings are even greater.

From the foregoing it can readily be seen that the true measure of a compressor's worth is the amount of air it produces for the amount of current it consumes. That thought must be kept in mind when purchasing a compressor. Another feature to be found in modern compressors is the improved intercooler which reduces the temperature of the air delivered to the tank. Naturally the cooler the air, the more efficient the compressor. In addition moisture must be removed and the operation should be vibrationless and quiet.

Radiator Water Flow

Equipment should consist of a vertical tank 1½ ft. in diameter by 5 ft. high. Capacity of tank, 66 gal. Tank to set so that top is 10 ft. from floor. Outlet size at bottom of tank—2½ in. Each inch of water in tank is 1.1 gal. Each gallon is 0.91 of an inch in tank.

YEAR	MODEL	Gallons per Minute
BUICK		
28	Standard	11.6
28	Master	14.0
29	Standard	15.2
29	Master	17.6
30	40	13.2
31	50	15.2
31	60	18.4
31	80-90	24.0
32	50	14.4
32	60	18.4
32	80-90	20.0
33	50	21.6
33	60-80-90	26.5
34-35	40	22.5
34-35	50	27.0
34-35	60	28.0
34-35	90	28.7
36	40	21.5
36	60-80-90	28.5
37	40	18.7
37	60	30.6
37	80-90	31.0
38	40	19.8
38	60	24.7
38	80-90	28.3
CADILLAC		
28-29	341	49.6
30	353	32.0
30-31	452, V-16	36.2
31	355, V-8; 370, V-12	34.5
32	All Models	29.6
33	355C, V-8	39.8
33	370C, V-12; 452C, V-16	35.1
34-35	V-8 Series 10, 20 and 30	31.5
34-35	V-12 Series 40; V-16 Series 60	35.0
36	60	29.0
36	70, 75	32.5
36	80, 85	35.5
37	8	32.8
37	12	30.6
37	16	33.3
38	860 Special	36.0
38	860 and 1690	32.8
38	865-75 Pass. and Commercial	30.6
CHEVROLET		
29-30	1½ ton LR, LS	13.4
29-30	AC, AD Passenger	13.1
31	AE Passenger	13.9
31	LT, N Truck	12.4
32	BB Commercial	13.9
32	1½ ton N, Truck	12.4
32	BA Passenger	12.8
33	Standard CC	13.0
33	Master CA	13.9
33	1½ ton Truck	15.1
33	1½ ton Heavy Duty	15.5
33	CB Commercial	12.8
34	Standard DC	13.5
34	Master DA	13.9
34	BB Commercial, 1½ ton P	13.5
34	1½ ton P Heavy Duty	15.5
35	EA and ED Master	17.9
35	EC Standard	18.2
35	EB Commercial	19.2
35	1½ ton Q	21.3
35-36	1½ ton Q and R Heavy Duty	21.5
36	Mas. and Std. FA, FD and FC	20.0
36	FB Commercial	22.0
37	Mas. GB, Mas. DeL. GA and Commercial	18.9
37	Comm. GC, GD, GE—½, ¾ and 1 ton	21.1
37	1½ ton S	19.8
37	1½ ton S Heavy Duty	30.6
38	Mas. HB—Rad. No. 3,109,033	18.4
38	Mas. DeL. HA and Mas. HB—Radiator No. 3, 109,032	21.1
38	Mas. and Mas. DeL. Rad. No. 3,109,355	18.9
38	Comm. HC, HD, HE—½, ¾ and 1 ton	18.9
38	1½ ton T	18.0
38	Comm. HD, HE and T Heavy Duty	21.6
CHRYSLER		
29-31	65-66	10.8
30-31	6-CJ	13.2
32	6-CI	23.6
32	8 Cylinder	30.0
33	8 CL, Custom Imperial	25.1
34	6 CA	23.8
35	8 CI Air Flow	51.0
35	8C2, 8C3 Air Flow	57.0
35	8CZ Air Stream	26.5
36	8C9 Air Flow	46.0
38	8C19, 8C20 Imp. and Cus. Imp.	34.6
DE SOTO		
30	8CF	10.4
31	8CF	15.6
31	6SA	20.1
32	6SC	22.9
DODGE		
30	8-DC Passenger	13.8
30	6-DD Passenger	13.5
30-31	F40, F41, F42, F60, F61, F62, F80, F81, F82, F83, Heavy Duty 2 and 3 ton Trucks	20.0
30-32	DD2A ½ ton	12.0
30-32	U2E 1½ ton	11.5
30-32	U2A ½ ton	13.8
30-32	U2 1½ ton	14.0
33	DPT, DP and DQ	20.4
33	T2E 1½ ton	17.0
33	T3G 2 ton and T3	18.5
34	T5	21.6
34	T2, T3	18.9
34	T7	21.1
35	DU Passenger	23.7
35	KC, KCL ½ ton	20.2
35	K-30-1-2-3 1½ ton	21.0
35	KH-45-6-7 2 ton	24.0
35	K60A, K61A, K62A 3 ton; K52, 4 ton	41.0
36	D2, D3, D4 Pass.; T24 Truck Early	19.0
36	D3, D4 Pass.; T24 Truck Late	16.2
36	D2 Passenger, Late	21.1
36	T23, T25, T26 Truck	17.1
36	T27 Truck	20.7
37	T38 Truck	18.9
37	T40, T41 Truck	17.7
37	T42 Truck	22.5
37	D5 Passenger	18.4
38	D8 Passenger (5/16 in. cell)	18.0
38	D8 Passenger (3/16 in. cell)	18.9
38	T40, 41 Truck	17.7
38	T42 Truck	22.5
38	T57 Truck	16.4
38	T58 Truck	20.2
38	T60 Truck	21.6
ESSEX		
29		34.4
30		39.2
31		34.4
32	6E	35.4
32	Terraplane	14.0
FEDERAL		
30	A, G, E, 6	35.0
31	D, E 6	27.0
31	T10 Special, 3C6, UL7, W4	29.0
31	A6, 5E6	44.0
33	A7	35.0
33	E4	26.0
33	A8	33.0
34	25A	88.0
34	40B	94.0
35	Q9	88.0
35	15D, 18D	68.0
35	25D	94.0
FORD		
28-31	A, AA	35.0
32	18 V-8	44.0
32	B 4 Cyl. and 4 Cyl. Truck	35.0
33	V-8	53.6
35	V-8	46.0
37-38	V-8, 60 horsepower	34.2
37-38	V-8, 85 horsepower	42.3
G. M. C.		
30	T-60, T-82, T-90	35.0
30	T-15, T-17, T-19	20.0
30	T-30, T-44	19.0
31	T-30, T-42, T-44	19.0
31	T-55, T-60, T-82, T-90	35.0
32	T-45	19.0
32	T-51	35.0
32	T-18	20.0
33	T-60	35.0
33	T-33, T-43	33.0
33-34	T-18, T-23	21.6
34	T-16	18.0
34	T-18, T-23	26.1
35	T-18, T-23, T-43	37.0
35	T-23	36.0
35	T-46	54.0
36	O-16 Taxi	20.0
36	T-14, T-16	21.5
36	T-48	40.5
37	O-17 Taxi	18.9
37-38	733 Bus	17.1
37-38	T-14 ½ ton	21.6
37-38	T-16, T-16H, F-16, F-16H, 1½-2 ton	27.0
37-38	T-16, T-16H, F-16, F-16H, 1½-2 ton Heavy Duty	30.6
38	O-18 Taxi	21.1
GRAHAM		
30	Standard 6 and Special 6	45.0
30	Std. 8; Cust. 8-127; Spec. 8, Cust. 8-137	47.0
30-31	Standard 612, 41A 6 cylinder	33.0
31	Std. 6; Spec. 6 Early, Spec. 8 and Custom 8	45.0
31	Standard 6, Special 6 Late	47.0
32	857 Blue Streak; 658	45.0
33	63, 64 Std. Cust. Blue Streak	47.0
33	Standard 65	21.6
34	6 Early	19.3
34	6 Late	21.6
35	Light 6 Model 74	23.7
35	Big 6 Model 73	24.4
36	77	19.0
37	Light 6 Crusader 86	20.2
37	Cavalier 95, Supercharger 116	21.6
37	Custom Supercharger 120	21.1
38	96 and 97	21.1
HUDSON		
29	Early	25.6
29	Late	19.4
30		16.4
31		16.8
32	T-U-L	19.4
33	8 Standard, Major	19.4
34	8 LT, LL	21.6
35	8	24.0
36	8 Early	22.0
36	8 Late	22.0
37	6	22.0
37	8	23.4
38	6	19 8
38	8	24.3
HUPMOBILE		
30	8-C	16.2
30	8-H	20.6
30	S-2, 6	12.5
31	8-L	20.1
32	8-222	20.8
32	8-226	21.9
33	6-321K	15.1
33	F-322, 8	23.8
33	I	24.2
34	W	22.8
34	T	17.0
34	J	10.4
34	J Special	13.3
35	D-518, 6	21.0
LAFAYETTE		
38		22.5
LA SALLE		
28	303	41.9
29	328	44.8
30-31		30.0
32		29.6
33		39.8
34		23.4
35-36		25.0
37		32.8
38		36.9
MACK, JR.		
37-38	½-¾ ton 4 cylinder	22.1
37-38	½-¾ ton 6 cylinder	19.3
MARQUETTE		
30	30	14.8
NASH		
38	6 and 8	22.5
OAKLAND		
28	212	14.0
28	All American	15.2
29	All American 6-228	17.1
30		29.6
OLDSMOBILE		
28	F-28	19.6
29	F-29	16.8
29-30	Series F	16.4
31		16.3
32	6	22.8
32	8	16.0
33	6 and 8	24.7
34	6	19.8
34	8	23.4
35	6	21.0
35	8	25.2
36	6	21.0
36	8	32.5
37	6	23.8
37	8	30.6
38	6	23.4
38	8	28.8
PACKARD		
30	826-828	19.7
31	740-745	23.2
32	128 Light 8	22.6
32	12	46.4
33-34	Light 8 Low	26.6
33-34	Light 8 High, Big 8 Low	25.5
33-34	Big 8 High	25.8
33-34	B-12 Low	42.6
33-34	B-12 High	44.1
35	8-120	22.6
37	6-115	21.2
37	8-120	27.9
37	8-120 De Luxe	27.9
37-38	V-12	42.0
38	6-115	33.3
38	8-1601, 02	34.2
38	Super 8	29.7
PLYMOUTH		
28	55	19.8
29		20.5
30	U	13.9
31-32	PA	15.8
32	PB Late	17.5
33	PC (Fedders)	20.4
34	PE De Luxe	21.5
35	PJ Early	19.7
35	PJ Late	17.8
36	P1	18.0
37	P3	16.6
37	Truck T-50	15.7
37-38	P3, P4, P6	14.9
PONTIAC		
30		22.1
31		29.4
32	6	31.7
32	8	22.1
33		24.7
34		23.4
35	6	22.8
35	8 Early	23.5
35	8 Late	23.0
36	6	20.0
36	8	22.0
37	6	18.9
37	8	26.5
37	8 Hot Climate	18.9
38	6	22.0
38	8	24.7
38	8 Hot Climate	18.6
REO		
29	Mate	12.4
29	2 ton	16.8
29	DA, DC 1 ton	15.2
29	2 ton Special	16.8
30	20-25	19.6
31	30	23.6
31	35	24.4
32	S	19.2
32	1215 Flying Cloud	25.2
33	6-S	25.2
33	Royale 8	30.6
34	6 Flying Cloud	24.7
34	Royale 8	29.3
34-35	1½ ton	21.0
35	6A	23.0
35	2 ton	24.0
35	1 SF-130	22.0
36	Flying Cloud	20.5
36-38	¾ (Fedders)	18.9
36-38	1½ ton	19.8
36-38	2 ton	20.7
36-38	17,413X Truck; 1½-2 ton 36-37 28,218 38	16.6
37-38	4-50, 4-75 Truck ½ to ¾ ton	22.1
37-38	6-50, 6-75 Truck ½ to ¾ ton	19.3
ROCKNE		
32	65	17.3
32	75	31.0
33		16.3
STEWART		
29	21, 21X	16.0
29-30	16X	18.5
29	30X	16.9
29	30	19.0
31-32	32X	36.4
34	42X, 43X, 44X, 45X	20.5
34	29X, 32X	21.8
STUDEBAKER		
28	President 8	28.0
28	Bus	27.0
29	Dictator	35.1
29	President 8	29.0
30	Commander	45.0
30	DA Bus	27.0
31	Dict 61, 71 Comm., Pres. 80-90	34.0
32	2 and 3 ton	24.7
32	62	30.2
32	President 91	34.0
32	71 Commander	31.0
33	State President 82	28.0
33	State President 92 Speedway	34.0
33	Standard 6; Regal 56	25.5
33	Standard 8; Regal 53	29.0
34	Dictator 6A	23.4
34	T2, T4, T6 and T8 Trucks	26.0
34	W8 Truck	35.3
35	1B 8 Cylinder, 1C 6 Cylinder	60.0
36	2C President	26.0
36	3A and 4A Dictator	20.7
TERRAPLANE		
32-33		15.6
34	6 (Harrison)	21.6
34	6 (McCord)	20.1
35	G	24.8
35	GU, GH	22.0
36	61, 62, 63	21.5
37-38		19.8
WILLYS		
35		17.0
36		15.5
37		15.3
ZEPHYR		
36		54.0
37		48.1
38		57.6



THE READERS' CLEARING HOUSE

of

Service Men's Queries

Increasing Generator Output

We are having trouble with a 1935 Dodge generator; also a 1936 Chevrolet generator. These generators are both new and they cut back at high speed about ten amperes drop; which is entirely too much. On both cars these generators are set up as high as possible; but fail to put out enough current to take care of the lights properly at high speed; at low speed they charge 20 amperes and better, I have hooked an extra battery and ammeter up at the generator; therefore I know that the trouble is in the generator.

The fan belts on both cars are in good condition and not slipping. Also both cars have had several rebuilt generators on them and they all seem to work the same way on these cars.

I would like to know what is causing this; and what can be done to remedy it? Also one of these generators has a large pulley on it; but it still does the same thing. Roy L. Hollinger, Hollinger's Garage, New Madison, Ohio.

THE difficulty you are experiencing with the 1936 Chevrolet generator cutting back at high speed is really not a difficulty but a condition that is normal with almost any third brush generator not equipped with a voltage or current regulator. The 10 amp. drop, while it may seem excessive, is actually provided for in the construction of the generator and there is very little you can do about it except to put a larger pulley on the unit which will, of course, cause it to turn at a

(*Continued on next page*)

TROUBLE?

If you are stuck with a puzzling repair job that just won't turn out right, write to BILL TOBOLDT, Editor of MOTOR AGE. Each month we present here a few of the numerous queries received. We'll try to straighten out your problems for you. Don't cuss—write us!

(*Continued from preceding page*)
compartively much slower speed.

If you wish, you might try this experiment—loosen the generator end-plate a sufficient amount to permit the removal of the locating pin in the generator frame (this is the little pin which locates the rear end plate). Now tighten the bolts slightly (leave bolts loose enough to permit the entire end-plate to rotate slightly).

Now start the engine and run at a fairly high speed (fast enough to cause charging rate to cut-back) and rotate generator end-plate a very slight amount. Watch for any increase in the charge.

If a slight increase is noted, it may be advisable to elongate the bolt holes in the end-plate in order to permit a further rotation.

This re-locating of the end-plate (and the brush rigging) will sometimes cause the generator to charge more at high speed with a corresponding loss at low speed.

The difficulty you are having with the 1935 Dodge generator may be caused by an improper adjustment of the voltage regulator.

Enclosed are several sheets taken from the 13th Edition of the Chilton Flat Rate and Tune-up Manual which will explain in detail how to test and set the voltage regulator.

Bushing Removal

To quickly remove tight bushings from a blind hole such as clutch pilot bushing in end of crankshaft, pack bottom of hole with grease to depth of half the length of bushing. Procure an arbor which will just fit inside the bushing and strike a sharp blow on the outer end of arbor with hammer. Pressure applied thus to the grease will force out the bushing. —*Chrysler Service Reporter.*

Smooth Idling

We are having trouble with a D-30 model International truck which runs very uneven while idling. It sounds as though it is choked.

We have rebored the job; installed new timing chain; replaced fuel pump (twice); tried three new carburetors; installed new points; condenser; rods; distributor cap; wiring and plugs; disconnected the muffler and all of this doesn't make any difference.

This job runs like a lily on the road and has all the power in the world but we can't seem to even the motor out. Charles E. McKay, DuPont and McKay, 4 Dracut Street, Lawrence, Mass.

THERE are several things that I would suggest in checking on your Model D-30 International truck that idles unevenly.

I assume that you have timed the ignition in accordance with the factory marks. This does not necessarily produce smooth idling due to inaccuracies in the distribution of fuel to the various cylinders and also inaccuracies in the breaker cam. I would, therefore, suggest that you try advancing the spark to see if you can't get a smoother idle. If that doesn't work, try retarding the spark. In this connection, I suggest that you follow the suggestions given in the article, "Shooting Trouble With Gages," which appeared in the January issue of Motor Age.

If you have not checked the automatic advance on the distributor, I suggest that you completely disassemble the distributor to make sure that the weights are not rusted and that the springs are of the proper tension.

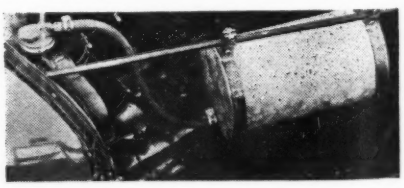
There is also a strong possibility that there are some leaks in the intake system which might be at the carburetor flange, the manifold flanges or at the intake valve guides. I would also suggest that you check the distributor shaft to make sure that the shaft and bushing are not worn.

I don't happen to have the carburetor specifications on that particular job but I would suggest that you try setting the float level about 1/16 in. to 3/32 in. below the factory recommendations. It would also pay to check the compression to make sure that the compression is equal in all cylinders. Also make sure that none of the valves are sticking. In this connection I would suggest running some valve oil through the carburetor.

On Water Loss

We have been having trouble with 35, 36, and 37 Model Oldsmobiles using water. We have checked these cars for leaks, and there isn't any, but water is low about ½ gal. every week. But the only possible way we can figure is that water at high speed is pushed out overflow pipe by water pump. Radiator has been flushed very good. Would appreciate any help in this matter. Alva Wilkison, Wilkison Auto Company, 214-216 South Main St., Kennett, Mo.

THIS trouble can be overcome by putting on an expansion tank. It seems that the radiators are just of



sufficient size to keep the engine cool but as soon as the engine is shut down, the water expands and flows out the overflow. By putting on an expansion tank, the water will go into the expansion tank and then back into the cooling system after the water once becomes cool.

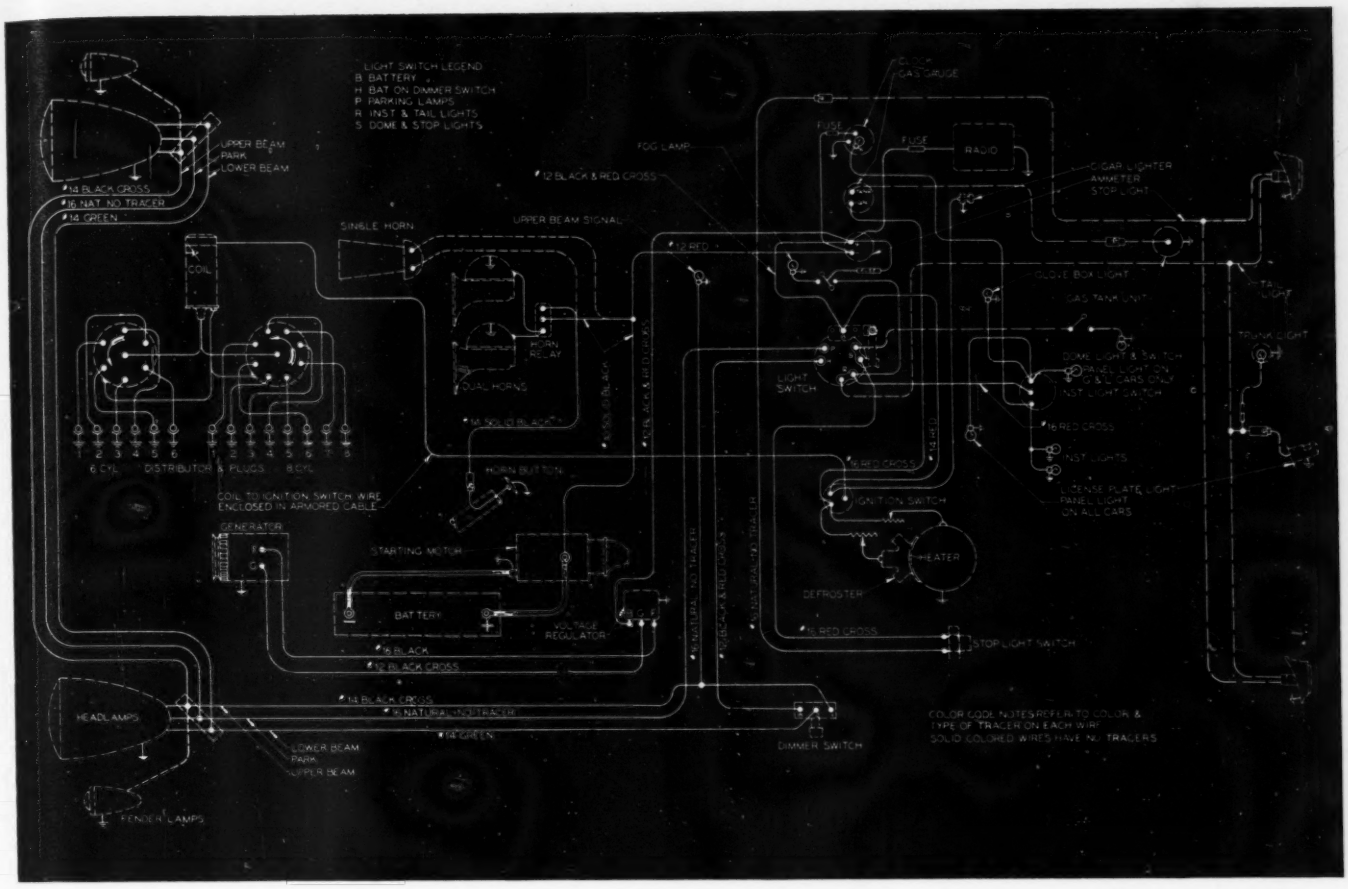
Increase Compression

I own an Essex-Terraplane 1933 Eight which I want to "sup" up.

Can you send me any information on dual carburetion or two carburetors? Thank you for your interest. Walter A. Horstmyer, Green Street, Schuylerville, N. Y.

ONE of the best things you can do to "sup" up your 1933 Essex is to increase the compression. In this connection, I suggest that you plane approximately 1/16 in. from the cylinder head in order to reduce the volume of the combustion chamber. This job normally has a compression ratio of 5.8 to 1 and by removing 1/16 in. from the cylinder head, you should increase it to approximately 6.25 to 1. I would also suggest a heavy-duty

"Now look—I didn't say I'd buy you a dinner ring—I said inner ring!"



Wiring Diagram for 1939 Olds—All Models

coil and after increasing the compression ratio you will probably have to use a slightly colder spark plug.

In regard to dual carburetion, I am sending you some information under separate cover.

I would also recommend that you install all new valve springs and, if you can obtain them, get springs of somewhat greater strength so as to reduce the possibilities of the valve dancing at higher speeds.

A good carbon and valve job would also assist materially and when I say good, I mean that both valves and seats should be refaced and then the valve lapped in by hand and check each seat with Prussian blue until you have a perfect seat.

Gasoline Consumption

I have a 1938 Plymouth Roadking coupe, purchased in June, from which I am not getting satisfactory gasoline mileage after 5000 miles of operation. It is equipped with a Carter carburetor and for some time I thought I was getting 18 to 20 miles per gallon at say 40 m.p.h., but lately it seems to have dropped to not better than 16 as an average. What do you suggest I do? J. F. Roberts, Lock Box 11, Richfield Springs, N. Y.

ON your 1938 Plymouth that is giving you unsatisfactory gasoline mileage, the first thing I would do would be to check the main metering jet and make sure that it is part No. 159-58S.

As a matter of fact, since you have 5000 miles on this car it would probably pay you to install a new jet and float needle valve and seat.

You might also try advancing the spark up to the pinging point, and also check your vacuum advance to make sure that there are no leaks at the diaphragm or in the line.

Tachometer Timing

Can you give me cam angles for the 1939 cars? Also please tell me at what r.p.m. do you run the engine when setting ignition timing with a tachometer. J. Paul Walker, Walker's Motor Service, 22 S. W. 1st Street, Miami, Florida.

I AM mailing a copy of the cam angle table taken from the current issue of the Flat Rate Manual which will give you cam angles on both Auto-Lite and Delco-Remy distributors. I don't think all the 1939 models are in there but it will at least give you the majority of them. I have been endeavoring to get cam angles on all the 1939 cars but so far have been unsuccessful, but as soon as I get it from Delco and Auto-Lite I'll see that you get a copy and also I will run it in Motor Age.

Now in regard to setting the timing with a tachometer, this is usually done at about 1500 r.p.m. In addition, the way I usually do it is to keep shorting out one cylinder after the other until the engine is running on one cylinder only. Of course this means that you have to keep opening the throttle wider each time you short out another cylinder until you are operating on practically full throttle when only one cylinder is firing. That puts quite a load on the engine and you can get a very accurate setting of the ignition.

It also gives you a test on the spark plugs, for after you run the engine on one cylinder, shift it to another until you have the engine operating on each individual cylinder. Naturally, any spark plug that isn't up to standard will give you plenty of preignition and also pop back in the muffler. It is a wonderful way of selling spark plugs as well as the best method I know of for setting the ignition timing.

Are the Plugs to Blame?

Being a subscriber to your Motor Age *and always interested in the Readers' Clearing House where I find much valuable information, I am sending in my request for help on a 1937 Pontiac 8.*

This car has had trouble with spark plugs ever since it was driven 2000 miles. The engine has about 25,000 miles on it, and is on its fifth set of plugs.

The owner had it to a shop and they put it through a test on their motor analyzer but nothing much showed up. So, they installed a new distributor, coil and condenser—but the plugs would not hold up. The

(*Continued on next page*)

(Continued from preceding page) owner then had a set of colder plugs put in, but they broke down.

Then he came to me. I put in a set of different make plugs than he had been using, that I have been having fine results from, but they went bad in 1500 miles. I then put in the next colder plug and now they break down above 50 m.p.h.

Sometimes when the car is cold, by opening the throttle wide it will cut out badly and backfire in the muffler. Then as you start out, it will clear up and run good up to 50 m.p.h., as I have stated.

You can take the plugs out and they look like new and you can see nothing wrong.

I hope I have made this trouble clear, and any information you can send me will be very much appreciated. T. V. Leonard, Leonard's Garage, Taberg, N. Y.

YOUR letter describing the spark plug trouble you are experiencing with a 1937 Pontiac Eight is very interesting. I can't quite understand, however, that if you are having spark plug trouble why it doesn't affect the appearance of the plugs. Or, did you mean that the plugs break down all of a sudden?

If the plugs have a blistered appearance when they finally fail, it is undoubtedly an indication that they are not cold enough for that particular engine and the service for which it is being used.

However, there might be additional complications such as back-pressure in the muffler which would result in excessive heat in the engine which would, in turn, affect the plugs.

Poor cooling in the water jacket might also have a similar effect and I would, therefore, suggest that you carefully clean out the cooling system and also check the muffler to make sure that it is not clogged.

There is a possibility that the trouble might be caused by slightly stuck valves since you say that the engine back-fires when cold and this proves that the spark plugs are firing. We would suggest that you remove the valves, clean up the stems and reseat them.

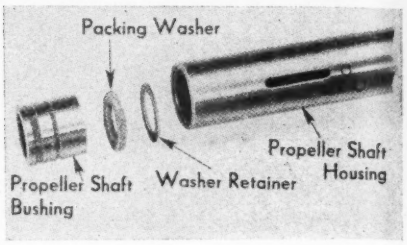
Grease Leak

We have just subscribed to Motor Age *and also purchased a new 1939 Flat Rate Manual and at this writing we wish to take advantage of your "Service Men's Queries" department. Our problem is as follows:*

We have in our service a Chevrolet "HC" ½ ton truck which has consistently leaked grease from the transmission back to the rear end. The truck has run 6000 miles and at each 1000 miles it is necessary to remove 1 quart of grease from the rear end and add same amount to the transmission.

Would appreciate your advice on this problem. H. C. Simmons, Simmons and Hill, Tonawanda, N. Y.

YOU should have no difficulty in overcoming the grease leak you are experiencing on the Chevrolet HC



½ ton truck.

This trouble is caused by a worn propeller shaft bearing or a defective grease seal at the front end of the propeller shaft. Replacing the bearing and the oil seal should overcome your difficulty.

Testing Thermostats

A thermostat can be tested by placing in a pan of water, on a small inexpensive hot plate—use a thermometer or car heat indicator to determine temperature at which it begins to open.—*Chrysler Service Reporter.*

Gasoline Not the Cause

I have a customer who is the owner of a 1938 Dictator Studebaker 6. He has travelled 28,000 miles with this car and has used nothing but the best grade of gasoline.

Recently he came in to inquire about a noise that had developed which was similar to a blown manifold gasket. Examination disclosed that the head gasket had blown at No. 4 piston.

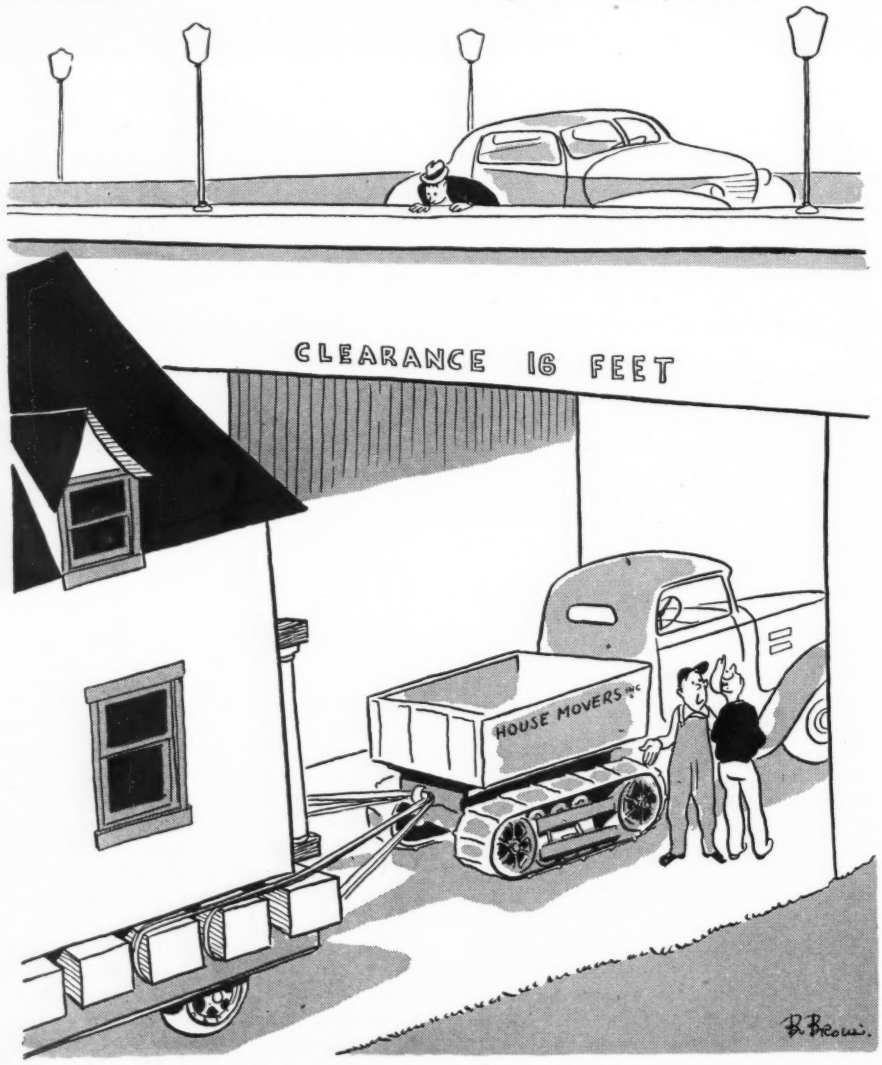
The spark plugs which had been installed about 7,000 miles ago, had been burned away, and the thermostat was all shot.

Some mechanic told him that the gasoline was too strong. In other words, he should not use Ethyl.

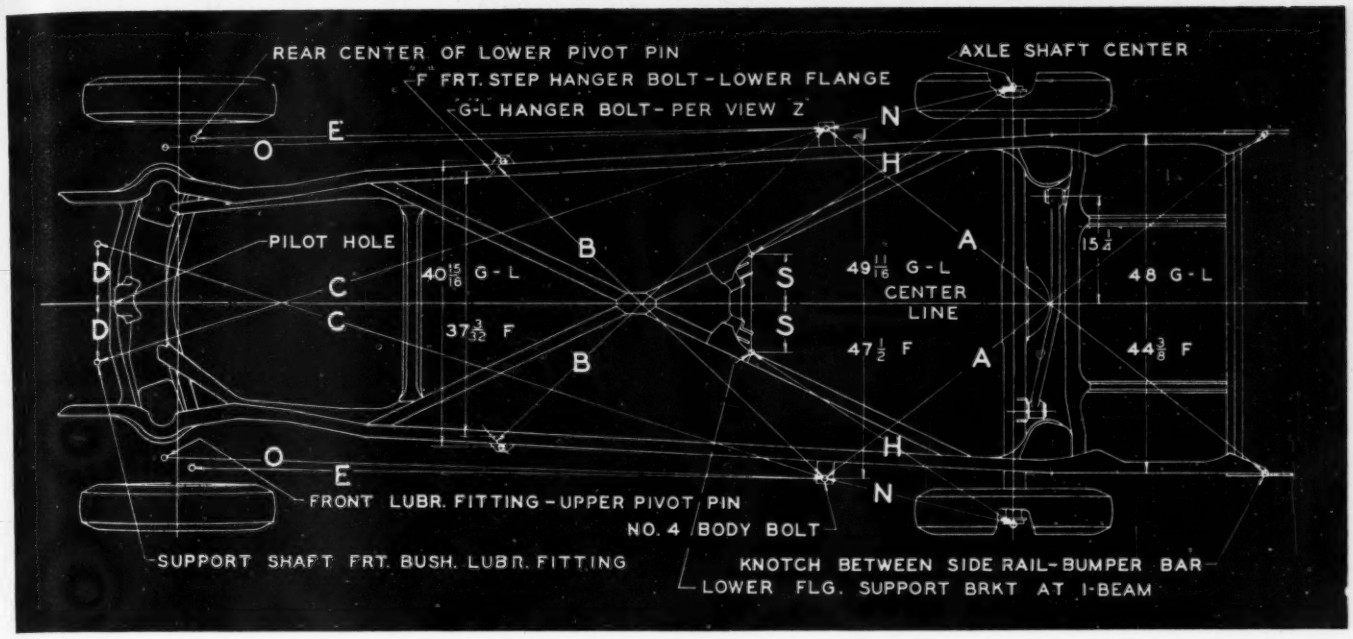
Would you kindly give me your opinion as to whether or not it would be possible for the gasoline to be the cause of the plugs being burned away at the points, and if not, the reason for same.

Also, what causes the motor oil to turn to a grayish color? Adolph L. Matthes, 46 Winthrop Ave., Lawrence, Mass.

I AM quite sure that the gasoline your customer used has nothing to do with the burning of the spark plugs. It is my belief that the spark plugs he had were probably the wrong type for the type of driving he was



"Guess we'd better write to Motor Age Clearing House."



Frame Alignment, 1939 Olds—All Models

doing and that he should use the next number colder plug to take care of the situation. To further bear out this opinion is the fact that he has already driven 28,000 miles on a 1938 automobile. In other words, this customer is a fast, hard driver and would require colder plugs than standard.

In reference to the color of the engine oil, I scarcely believe that this is the result of the gasoline. I am inclined to believe that there is some other cause for this. It might be well to check this motor for water leaks into the crankcase. The fact that the head gasket blew out between cylinders might have resulted in a crack at this point so that the cooling system solution is leaking into the crankcase.

Depreciation

I wrote you in 1937 concerning an article entitled "The ABC's of Shop Bookkeeping." You sent me tear sheets of Part 1 of this article. Do you still have sheets of the other parts of this series? You told me that you would be glad to answer any questions I might have—so I feel free to ask you for information.

I would like to know how depreciation is figured on shop equipment, etc. I would appreciate it very much if you would send me the remaining sheets on shop bookkeeping and also answer my question. L. M. Peterson, 102 N. Exchange Street, Galva, Ill.

IN accordance with your request, I am sending you a complete set of the series of articles entitled "The ABC's of Shop Bookkeeping."

There are various methods of tabulating depreciation of shop equipment. In general, a certain percentage of the price of the equipment is set aside each month until the amount set aside equals the cost of the piece of equipment. In general, the percentage is approximately 2 per cent each month on a piece of equipment whose life would be approximately five years. If the life of the equipment is only one year, then, of course, you have to figure on 100 per cent depreciation per year.

Loss of Power

The writer has a 1929 8-cylinder valve-in-head Marmon Model 78 which has been acting strangely for several weeks. Lately it has been getting worse.

The engine every few blocks will suddenly lose power and begin firing irregularly. This does not happen till the engine has warmed up. If when this loss of power occurs the throttle is opened wide the engine will pick up and after a few movements will regain its power. If allowed to idle when this loss of power occurs, the engine will promptly stop running and is then hard to start again.

The writer has had the gas line and carburetor checked and the ignition points synchronized. There does not seem to be any valve sticking. The head has not been removed to find out whether such is the case. There are no broken valve springs.

When the motor is speeded up even when it is running O.K., there will be a popping sound in the exhaust and the motor does not attain as high a speed as it should.

When the engine is running under this unusual condition and a spark plug wire is removed and held near the plug it shows a hot regular spark. When the motor is running O.K. it seems to have all the power it usually has. H. T. Eddy, 4952 Blondo Street, Omaha, Neb.

THE first thing that I would do on your 1939 Marmon would be to give it a good carbon and valve job so as to be sure that you have compression in all cylinders and also that none of the valves are sticking. While

(*Continued on next page*)

"It really runs nice—I had 'er out myself this morning!"

(*Continued from preceding page*)
you have the valves out, make sure that you do not have excessive clearance between the valve stems and guides and on reassembling make sure that you use new gaskets for the manifold.

I think it would also pay to have the carburetor completely rebuilt. Also check the distributor shaft for excessive side-play and if necessary renew the shaft and bushing.

I note that this car has an old type vacuum tank and I would strongly recommend that this be carefully checked and replaced if there is any doubt about its condition.

Hard Starting

Can you tell me what causes a 1928 Pontiac car to start hard. I have a motor testing gage that shows a normal engine but it starts hard. . The valves have been ground and new piston rings put in. I can set the idle screw whichever way I want to, but the engine still starts hard. The timing is correct and the distributor wires are on correctly. Daniel Berger, R. 1, Box 11, Taylor, N. D.

THERE are several things which might cause the hard starting difficulty you are experiencing on a 1928 Pontiac. First of all, I would suggest that you check the battery ground connection and also run a ground directly from the distributor housing to the battery ground. I would also recommend the installation of a larger battery so as to be sure that there is ample current for both turning the starter and supplying the ignition system.

I think it would be worthwhile to check the valve guides to make sure that they are not excessively worn.

Remember them? **Here's some of the nameplates and radiator emblems that you may have seen in your shop—but not recently. They are part of a collection of more than five hundred owned by Frank Walker, head of Pontiac Motors' courtesy department.**

Do It This Way

The other day I had occasion to remove the transmission from a 1934 Ford car and was quite surprised when, upon referring to your Flat Rate Manual, I found the price of $5 for this job.

That certainly is much too low. The engine has to be removed before you can get the transmission out and you have a price of $9.50 for removing the engine. Does that mean that $5 is to be added to the price of $9.50 to make the charge for removing and installing the transmission? Please explain. L. Perlman, Franklin Field Motors, Inc., 972 Blue Hill Avenue, Dorchester, Mass.

NO, you shouldn't add those two operations together to get the price for removing and installing the transmission. In fact, you don't have to remove the engine.

I think that you will find that it takes much less time if you disconnect the universal joint and the rear spring from the frame, and the brake lines, and then pull the rear axle and torque tube assembly back out from under the car. The transmission is then easily removed and replaced and by doing it in that way you will find that it takes much less time than by removing the engine.

Yes, It Can Be Done

Had occasion to remove the camshaft from a 1936 Ford and discovered that the operation can't be done as you suggest, that is, by blocking up the valve lifters. Maybe I don't understand just what you mean. Will you please explain? Arthur S. Burg, Burg's Automotive Service, 600 Okeechobee Road, West Palm Beach, Fla.

I CANNOT understand why there should be any difficulty in blocking up the lifters on a 1936 Ford so as to permit removal of the camshaft. All that is necessary is to use a large cotter pin or nail and pass it through the groove in the lifter so that it extends out on the far side of the lifter. This will hold the lifter sufficiently high to permit withdrawal of the camshaft.

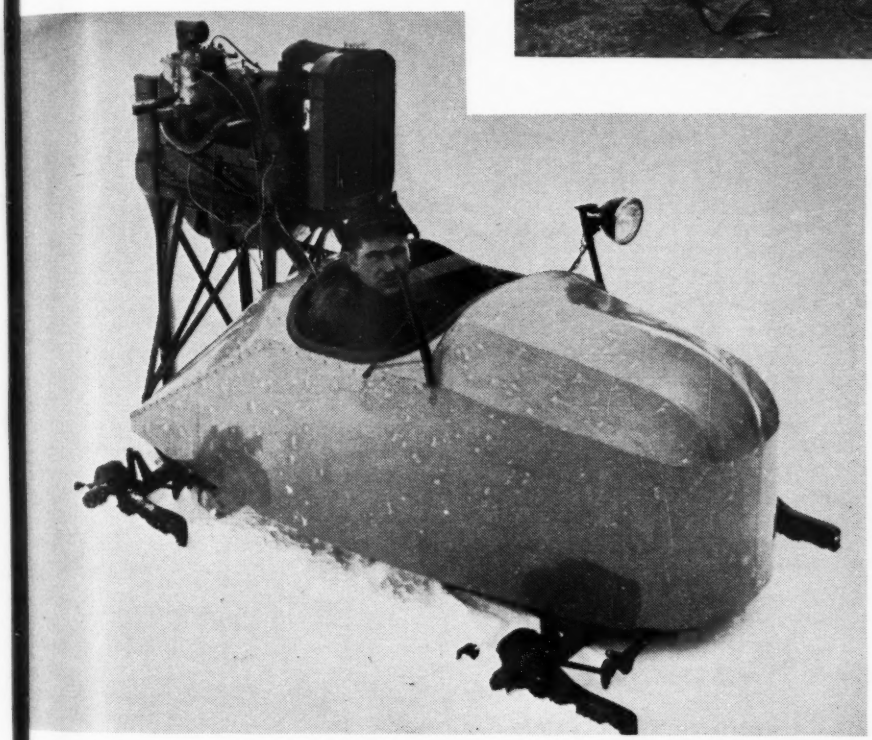
Lock Removal

A cube shape piece of wood one-half inch in size will aid in removing and installing door lock assemblies such as used in 1938-39 Plymouth cars. With door trim removed, hold the door lock in the released position.

By reaching up inside of the door it will be possible to insert the wooden block between the lock assembly frame and the lock bolt. In attempting to release the lock it will be found that the wooden block is held firmly in place with the lock bolt still retracted. In this position the lock assembly is easily removed or installed.—*Chrysler Service Reporter.*

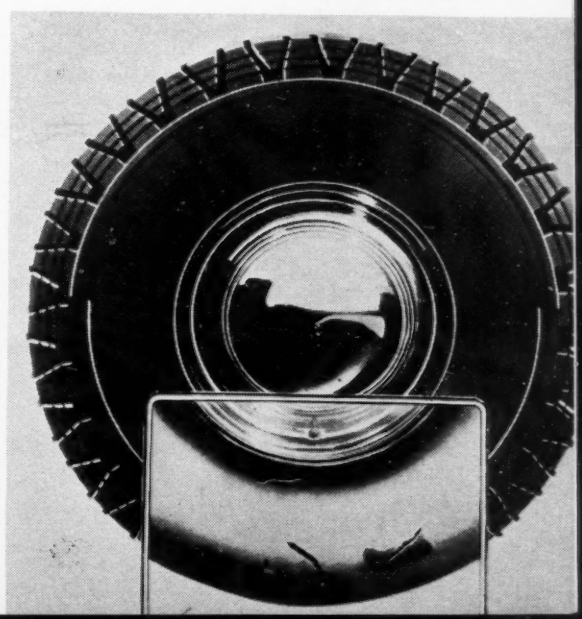
The overalled figure on the right should be familiar to you. It's Douglas Corrigan who, a few months ago flew into fame with his "wrong way" hop to Ireland. Although he has earned a reputed $75,000 as a film actor and author of a book, it is said he prefers to spend his spare time working on his 10-year old car. He is seen here jacking up the car preparatory to a brake reline job.

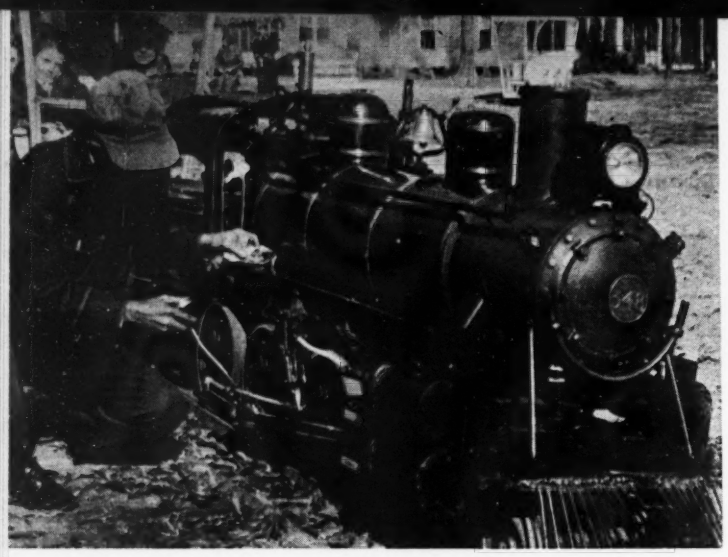
Fred Trebilcock, below, of Oxford, Maine, built this home-made "snow plane" from discarded automobile parts. He claims it is capable of speeds up to 100 m.p.h.



Assen Jordanoff, below, Roosevelt Field pilot and engineer, taking the temperature of the "frozen" gasoline in the tank of his airplane. Jordanoff claims that he has perfected equipment which makes gasoline non-inflammable. He freezes gasoline in the tanks with dry ice and alcohol. He heats it with a special apparatus as it enters the engine. If flame or a tracer bullet should hit the tank, Jordanoff claims that the gasoline will not burn because the freezing eliminates the volatile fumes. Note dry ice around the tanks.

An X-Ray apparatus, such as is shown above, which spots imperfections, weak spots and hidden nails in casings, is expected to save automobile owners much grief. The car owner looks through the machine and sees casing faults appear as illustrated in the photograph below.





Edgar Strahan, Louisiana repairman, fulfilled a life-long ambition when he completed this miniature locomotive made from auto parts and pieces of farm implements. The front part of the engine is made of a brake drum and the cow-catcher was once part of a farmers harrow. The 15 hp. engine runs on 1000 ft. of track.

A motorist wanting to cross the Sahara Desert in his own car is allowed to do so only if he observes the strict regulations issued by the authorities. The traveler must be able to show: food supplies for at least eight days; drinking water for the same period; gas for at least 500 miles: planks and shovel in case the car sticks in the sand. Authorities recommend engine tune-up before starting.

Indianapolis Speedway "Revamped"

"Singing Bricks" gradually give way to asphalt surface for safety.

Finding a brick in the Indianapolis Speedway one of these days is going to be as difficult as the search for the gold "corner-stone" brick which disappeared from the straightaway shortly after it was placed in 1909.

For, in modernizing the world's only brick speedway to meet the demands for increased speeds, workmen have covered the greater portion of the two-and-one-half-mile course with an asphalt surface.

The latest stretch to lose the brick path which has been the Indianapolis Speedway since the first 500-Mile International Sweepstakes in 1911 is the back straightaway. The mile-long stretch was recently given the finishing touches of the complete resurfacing.

While probably shielding a secret feeling of regret at covering-up of the bricks, speedway officials laud the modernization for its safety element. The Kentucky Rock Asphalt, says T. E. "Pop" Myers, general manager of the speedway, will allow increased speeds with the minimum of skidding hazard. It has been skids on the slick surface of the bricks in past years that have sent Billy Arnold, Wilbur Shaw and other kingpins of the grind over the outside wall. Too, drivers for years have complained of the terrific "beating" they have taken because of the rough surface of the bricks, despite the constant repairs. The asphalt surface will place the driver comfort at its peak, Myers said.

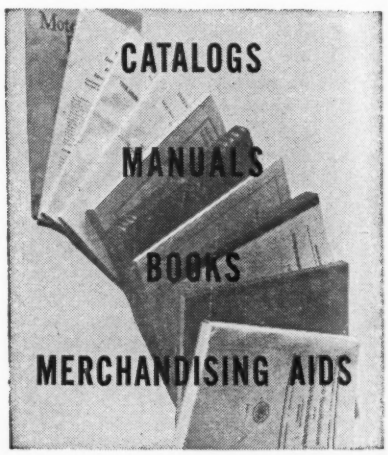
After their 500 mile grind, drivers have weighed in five to fifteen pounds less than their weight at the start of the long test.

Fans attending the twenty-seventh annual classic on May 30 will continue to thrill to the "singing" bricks. For much of the home stretch has not yet fallen "prey" to the modernization. although much repair has been done there.

The Indianapolis Speedway originally was of crushed stone-asphalt surface. That was back in 1909, before the first race convinced the speedway builders that a brick surface would better serve speed's demands. The last brick placed was the gold "corner stone" brick, unsuccessfully protected by a chain from "souvenir" seekers. Shortly after Thomas R. Marshall, Indiana's governor who later became U. S. vice-president, laid the brick, speedway officials reported the "nugget" was missing. Old timers will tell you the brick served as a doorstop for several years in an Indianapolis home and later was found in an Indianapolis junk yard.

Cars raced over the brick surface on May 30, 1911, for the first time in quest for laurels in the first 500-mile sweepstakes.

A checkup on ticket sales, which opened January 16, points to an all-time record crowd for this year's classic, even surpassing the 200,000 claimed at Indianapolis as the greatest crowd ever to attend any sports event in all history.



Borg-Warner Corp. again offers its slide rule to repair shop operators desiring to operate on a quota system. The rule indicates dollar resale volume and monthly number of parts which should be sold in accordance with the number of possible repair jobs in the shop's territory. In addition to the slide rule, Borg-Warner supplies printed forms for maintaining a salesmen's quota and sales record.

Wendell Manufacturing Co. of Chicago is sending, free of charge, to automobile painters and helpers a plan for making more money in their field. This plan is a comprehensive one, and teaches automobile painters and their helpers how to stripe cars at a profit. The Company will be glad to supply this instruction pamphlet free of charge.

United Motors Service has just announced what is said to be the most elaborate merchandising program on Hyatt and New Departure bearings ever undertaken in the bearings replacement field. Sales representatives of the branches during the next month and a half will contact each of the authorized bearing distributors of United Motors Service throughout the country and explain in detail this 1939 bearings program.

The essentials of the program consist of greatly increased availability of the merchandise, new working tools, modern sales helps, a spring stocking program and a sign and identification program.

The 1939 Black & Decker catalog, now ready for distribution, features a complete line of quality Portable Electric Tools and accessories. It

(Continued on page 60)

Hupp Announces Skylark Prices

Hupp Motor Car Corp. anticipates early start of production on the Skylark models which created widespread interest in the trade and among owners when shown at the Automobile Shows. W. A. MacDonald, vice-president in charge of sales, has released to Hupp distributors and dealers Detroit delivered prices on the new Skylark as follows: the Flagship, $895; the Mainliner, $975; the Cruiser, $1,075; the Corsair, $1,145. These prices include Federal tax. The Corsair may be had in either a convertible phaeton or cabriolet—the others being four-door, five-passenger touring sedans with differing accessory groups. MacDonald stated that in addition to these models custom cars featuring special upholstery, paint, trim and equipment would be offered at prices ranging up to $2,000.

DeVilbiss Training School Schedule

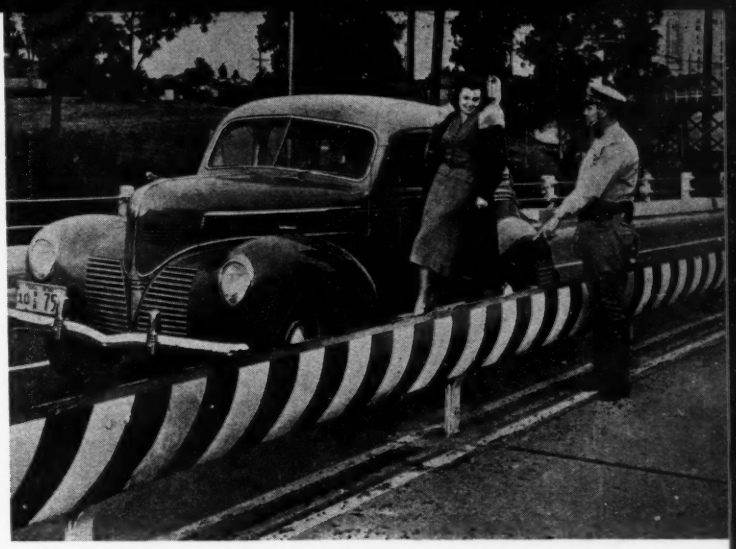
The DeVilbiss Company announces the schedule of their training school for the first half of 1939. This school is open to industrial painters, master painters, automobile refinishers, and all others interested in learning the technique of spray-painting, and the use and care of spray-painting equipment.

The training period lasts for one week. Classes will start on the following dates: March 13, April 17, May 15, and June 5. Special rates in Toledo hotels and boarding houses near the plant have been secured by the company for men attending the school.

It is advisable to enroll in the school as far in advance as possible, the company states, since the size of the classes must be limited and since there will be no training periods other than those announced. Complete information may be obtained by writing The DeVilbiss Company, Toledo, Ohio.

New Diesel Aircraft Engine Proposed

A new type of two-stroke Diesel aircraft engine is proposed by Edward T. Rodgers, who is said to have been connected with the automobile industry in this country in its pioneer days and later to have established the motorcycle industry in Japan. The engine designed by Mr. Rodgers is an 18-cylinder two row radial with cylinders of 6½-in. bore by 7½-in. stroke. Air intake is controlled by a single sleeve valve per cylinder and exhaust by an oscillating valve in the upper part of the cylinder, motion being transmitted to the oscillating valve through the sleeve valve. Air is taken in through ports at the bottom of the stroke, while exhaust takes place through eight exhaust ports in the cylinder head which are alternately covered and uncovered by the oscillating valve. Salt-cooling is provided for the exhaust valve, which is made of special K.E. valve steel.



Miss Vivian Coe inspects a new type center road divider installed on the Ramona Boulevard, Los Angeles, Cal., as officer Carl Heisterman explains its purpose. It is said to be the first installation of its kind in the world. Blinker lights have been installed at 100 ft. intervals as a night traffic safeguard.

After thousands of motorists complained that they had been victimized by gas dealers working on a cut-price basis, the Illinois State Finance Department put this mobile testing unit in the field to travel unannounced to service stations, testing the fuel in the pumps to see if it meets State specifications. Field representative William Hayes is shown entering the trailer laboratory.

Educational Plan for Tune-Up Training

Home study course developed by West Coast trade institution

The growing importance of training men in motor tune-up was emphasized at a meeting held recently in Los Angeles under the auspices of the Motor Trades Association of Southern California.

The various speakers discussed recent developments in tune-up services, and merchandising methods that have proven most successful for promoting tune-up. A plan of training, under the auspices of National Schools, a Los Angeles trade institution, was divulged, whereby servicemen will be able to train for tune-up under the direction of practical experts actively engaged in automotive work. For more than two years the course, based on a home-study plan, has been in process of development, under joint supervision of officials of automotive associations, parts manufacturers, oil companies, tune-up equipment manufacturers and others interested in the education of service men.

President J. A. Rosenkranz, of National Schools, announced that the entire course is now complete and will be made available to the industry at large. Speaking on behalf of the Motor Trades Association, George Zamboni, official of the Petroleum Educational Institute stated: "No merchandising program could be constructed, complete, without taking into consideration the problems affecting the particular industry it is intended to serve. Every year brings new problems which are added to the unsolved ones of the past. The maintenance branch of the automotive industry is in sorry need of favorable legislation. We need a compulsory inspection law. It would be a tremendous benefit to the motoring public, and would benefit your business. It is not an individual problem and cannot be solved by an individual. It must be met and solved by an organization. The attitude of the motoring public is so important that it cannot be left in the hands of the individual. One unscrupulous operator can do more to tear down public trust than a dozen can build up. The attitude of the motoring public is all important, and the industry cannot neglect it. The confidence of the public in this branch of the industry will largely affect the patronage it will receive, and will directly affect volume of business."

Class Winner in the recent Gilmore-Yosemite Economy Run was this Overland Sixty which took first honors in class "A." The car is shown here following the winding mountain road 40 miles from its goal. Due to icy roads and adverse weather conditions only 16 of the 28 contesting cars finished within the time limit. Other details of the run are included in the news story on this page.

Bad Weather Hit Economy Run Contestants

Studebaker Takes Top Honors; 12 of 28 Starters Disqualified

Top honors in the annual gasoline mileage test between Los Angeles, Calif., and Yosemite National Park, 314.5 miles distant, went to a Studebaker Commander "6" sedan last month. The event is sponsored by the Gilmore Oil Co., and the firm's gasoline and oil were used exclusively by the entrants.

Cars entered in this economy run were classified as follows:

A—Under $800	F—$1201 to $1300
B— $801 to $1000	G—$1301 to $1350
C—$1001 to $1060	H—$1351 to $1500
D—$1061 to $1130	I—$1501 to $1750
E—$1131 to $1200	J—$1750 and up

These are Los Angeles prices according to rail freight delivery for standard five passenger, four door sedan, with standard equipment.

Of the 28 cars from nine price classes which battled slippery highways and snow-covered mountain peaks, 16 were given official rating based on the ton miles per gallon of gasoline. Twelve were disqualified because they failed to complete the run in the 11 hours specified in the entry blank approved by the American Automobile Association's Contest Board. Art Pillsbury, regional director of the AAA board and a member of the governing group, was in charge of the economy run. He directed a staff of 13 AAA representatives and technical experts.

William C. Martin was driver of the Studebaker which averaged 55.875 ton miles per gallon of gasoline to show the best average regardless of class. Leaders in each class were given top honors for their particular price group also.

To average the winning ton mileage, Martin's Studebaker averaged 25.78 miles per gallon at a speed of 28.63 miles per hour. The car consumed 12.2 gallons of gas in carrying its load of 4335 pounds, which represented 3490 pounds for the car and weight of five passengers. The Sweepstakes trophy credited to the Studebaker was in addition to the trophy for leading Class "F."

Second honors regardless of class went to a Packard 120 sedan driven by L. P. Butts. The car showed an average of 52.963 ton miles per gallon.

A fraction behind, in third place, was a Studebaker President "8" driven by J. E. Van Sant. The average ton miles per gallon was 52.914.

The accompanying chart shows the detailed results of each car that started the run, giving the winner in each class. Although the cars disqualified are included in the chart, their results are not to be compared with the cars that finished on time, in the opinion of Mr. Pillsbury.

In several instances, it is noted, disqualification came on tardiness of only a minute or less than 10 minutes.

The ton mileage of this year's winner was a fraction short of the average credited to the Graham "6" supercharged touring sedan which won the 1938 honors. The Graham averaged 55.93 ton miles per gallon.

(*Continued on page* 57)

Class	Position	Car	Type Car	Driver	Total Speedometer Miles	Total Time for Run	Gas Used	Weight of Car	Total Weight, Car and Passeng.	Type Drive	Ton Miles	Miles per Hour	Miles per Gallon	Ton Miles per Gallon	Sweepstakes
A	1	Overland	Sedan	Bennett Hill	318	10 hr. 56 m.	12.0	2410	3260	S	512.635	28.77	26.21	42.720	
	2	Overland	Sedan	"Babe" Stapp	318	10 hr. 53 m.	12.4	2400	3228	S	507.603	28.90	25.36	40.936	
	Dis	Overland	Sedan	Walter Hersley	318	11 hr. 04 m.	11.7	2390	3229	S	507.760	28.42	26.88	43.398	
B	Dis	Ford 85	Sedan	C. R. Rocheville	323	11 hr. 05 m.	12.8	3110	3960	S	622.710	28.38	24.57	48.649	
	Dis	Hudson 112	Sedan	Walter Jennings	318	11 hr. 19 m.	12.9	3030	3854	AC	606.042	27.79	24.38	46.980	
	Dis	Chevrolet	Sedan	Roy H. Woods	313	11 hr. 16 m.	13.5	3153	4003	S	629.472	27.91	23.30	46.628	
	Dis	Plymouth	Sedan	Ben Cole	316	11 hr. 14 m.	13.8	3010	3835	S	603.054	28.00	22.79	43.700	
C	1	Oldsmobile 60	Sedan	John C. Bodine	327	10 hr. 54 m.	14.7	3250	4091	S	643.310	28.85	21.40	43.763	
	2	Dodge Spl.	Sedan	Herb Ford	317	9 hr. 51 m.	15.0	3210	4010	S	630.573	31.93	20.97	42.038	
	Dis	Pontiac Quality 6	Sedan	Austin Elmore	324	11 hr. 14 m.	14.4	3265	4115	S	647.084	28.00	21.84	44.936	
D	1	Nash Lafayette	Sedan	Andy Henderson	327	10 hr. 31 m.	14.8	3610	4460	OD	701.335	29.90	21.25	47.388	
	Dis	Dodge De Luxe	Sedan	Joe Bozzani	320	11 hr. 31 m.	13.4	3250	4100	S	644.725	27.31	23.47	48.114	
E	1	Chrysler Royal 6. (No overdrive)	Sedan	Ray E. Schafer	314	10 hr. 58 m.	15.7	3470	4274	S	672.087	28.68	20.03	42.808	
	Dis	Mercury	Sedan	W. R. Knopp	321	11 hr. 08 m.	13.2	3260	4106	S	645.669	28.25	23.83	48.914	
	Dis	Pontiac De Luxe 8	Sedan	Fred Miller	316	11 hr. 01 m.	14.8	3540	4390	S	690.328	28.55	21.25	46.644	
	Dis	Hudson 6	Sedan	O. J. Wedgeworth	320	11 hr. 05 m.	14.1	3230	4080	AC	641.580	28.38	22.31	45.502	
F	1	Studebaker Commander 6	Sedan	William C. Martin	309	10 hr. 59 m.	12.2	3490	4335	OD	681.679	28.63	25.78	55.875	1st
	2	Chrysler Royal 6. (Overdrive)	Sedan	Eddie Seward	310	10 hr. 43 m.	13.4	3500	4297	OD	675.703	29.35	23.47	50.426	
	3	Hupmobile 6	Sedan	Tom Moore	312	10 hr. 53 m.	15.2	3615	4465	OD	702.121	28.90	20.69	46.192	
	4	Nash Ambassador 6	Sedan	H. Floyd Brown	320	10 hr. 26 m.	15.8	3720	4570	OD	718.633	30.14	19.91	45.483	
	Dis	De Soto	Sedan	Don Langmo	315	11 hr. 08 m.	13.6	3470	4301	OD	676.332	28.25	23.13	49.730	
G	Dis	Oldsmobile 80	Sedan	J. W. Schiller	340	11 hr. 03 m.	15.2	3685	4473	AT	703.379	28.46	20.69	46.275	
H	1	Studebaker President 8	Sedan	J. E. Van Sant	303	10 hr. 57 m.	13.7	3760	4610	OD	724.923	28.72	22.96	52.914	3rd
	2	Packard 6	Sedan	Frank E. Podas	299	10 hr. 59 m.	14.3	3760	4585	OD	720.991	28.63	21.99	50.419	
	3	Nash Ambassador 8	Sedan	Jules Ellingboe	347	10 hr. 31 m.	16.5	4000	4850	OD	762.663	29.90	19.06	46.222	
	4	Hudson 8	Sedan	Norman Williams	310	11 hr. 00 m.	15.4	3560	4392	AC	690.642	28.59	20.42	44.847	
	Dis*	Hupmobile 8	Sedan	Ray Logan	308	11 hr. 20 m.	16.4	3980	4830	OD	759.518	27.75	19.18	46.312	
I	1	Packard 120	Sedan	L. P. Butts	302	10 hr. 57 m.	14.4	4000	4850	OD	762.663	28.72	21.84	52.963	2nd
J	1	Lincoln Zephyr	Sedan	Geo. W. Magee	327	10 hr. 59 m.	16.0	3995	4832	X	759.830	28.63	19.66	47.490	

LEGEND:

Dis—Disqualified under entry rules because car did not complete run in required 11 hours.
Dis*—Disqualified because car was late—due to wreck.
S—Standard drive.
AC—Automatic clutch.
AT—Automatic transmission.
OD—Overdrive.
X—Two speed rear axle.
Hr., m.—Hours, minutes.

NOTE—Speedometers were tested and all cars were restricted to maximum speed of 55 M.P.H. Each car carried an observer nominated by an opposing entrant. Ranger ordered that rear chains be placed on all contestants' cars 42 miles from the finish, because of snow at high elevation.

CHAMPION SPARK PLUGS are the choice of thrifty dealers because they recognize in Champions the qualities which make them *the preferred* stock investment.

Champion Spark Plugs have earned and continue to enjoy a unique position among replacement items. They are preferred by the buying public; they have a world-wide reputation for making every engine a better performing engine; they enjoy unequalled advertising support; and as a result they offer the dealer the surest way to make certain of maximum profits and turnover, and in turn insure customer satisfaction.

Champions are literally and figuratively the *preferred stock* investment in the spark plug field. Invest *your* money safely and securely by buying and selling *"Champions Preferred."*

IT'S THRIFTY TO STOCK AND SELL CHAMPIONS

PARTS NUMBERS AND PRICES

Pontiac Quality Six—Model 39-25—1939

Front Suspension

Mfr's Part No.	No. Per Car	List Price Each
492196—Knuckle	2	$6.50
410915—Knuckle support, L.	1	5.00
231843—King pin	2	.85
231905—King pin bush.	4	.15
230679—Pin thrust brg.	2	.50
230857—King pin lock pin	2	.15
231760—Upper arm pin	2	.50
500863—Pin bush. threaded	2	.35
1298827—Pin bushing plain	2	.30
410945—Support arm low, L.	1	5.00
412107—Low. arm pin	2	.60
411147—Low. arm pin bush.	2	.35
411382—Pin bushing seal	4	.05
411144—Low. arm shaft	2	1.75
502721—Shaft bushing	4	.35
411146—Shaft bush. seal	4	.10
502840—Main coil spring	2	5.00
264939—Tie rod assem	2	1.50
264924—Tie rod adjuster	2	.25
264944—End assem., L	1	2.00
502023—Knuckle arm, L	1	1.80
502125—Front wheel, prime	2	9.00
501998—Hub & drum, L	1	9.00
909002—Wheel bearing in	2	2.90
909001—Wheel bearing out.	2	1.95
500257—Grease retainer	2	.20
502333—Brake lining pri.	2	1.00
502334—Brake lining sec.	2	1.00

Steering

265207—Drag link	1	1.75
264946—Ball seat	4	.15
335976—Seat spring	2	.20
264950—Pitman arm	1	1.75
264953—Idler arm	1	1.00
263278—Cross shaft	1	6.50
263305—Cross shaft bush.	1	.30
263417—Gear housing	1	3.50
264960—Tube and worm	1	5.50
263303—Worm eccen. sleeve	1	.65
262200—Worm brg. cone	2	.85
263917—Worm brg. cup	2	.60
265083—Jacket tube	1	2.65
264887—Jacket tube brg.	1	.75
502533—Steering wheel	1	6.00

Cooling

3112107—Rad. core assem	1	34.00
502569—Rad. shell, prime	1	9.00
502082—Rad. grille, inner L.	1	4.00
502084—Rad. grille, outer L.	1	4.50
502144—Rad. grille, center	1	6.50
3108570—Thermostat	1	1.00
501912—Water pump assem.	1	7.50
501182—Pump impeller	1	.75
503230—Shaft and brg.	1	2.65
501596—Pump seal	1	.50
501751—Fan blades	1	1.50
500064—Fan belt	1	1.50

Fuel and Exhaust Systems

433S—Carburetor assem.	1	19.00
496—Fuel pump exch.	1	2.50
515—Fuel & vac. pump exch.	1	4.80
503253—Inlet manifold	1	4.75
502290—Exhaust manifold	1	7.50
500867—Muffler	1	3.75
502395—Tail pipe	1	1.75
502393—Exhaust pipe	1	1.70

Engine Gaskets

500372—Carb. to mani.	1	.07
408151—Fuel pump	1	.03
496783—Exh. pipe flange	2	.10
502288—Exhaust cover	1	.10
497160—Mani. to block, F.	1	.10
497162—Mani. to block, C.	1	.10
497161—Mani. to block, R.	1	.10
500687—Cylinder head	1	1.00
544351—Oil pan set	1	.50
494663—Main brg. cap seal	2	.02
501850—Main brg. seal	2	.05
499643—Timing case cover	1	.15
492085—Timing case seal	1	.40
497544—Valve cover	2	.15
494904—Water outlet	1	.02
499888—Water pump to cyl.	1	.03
499887—Water pump cover	1	.03

Engine Parts

503149—Block with pistons, pins and rings	1	87.50
501343—Cylinder head	1	12.00
501844—Oil pan	1	3.50
501784—Crankshaft	1	36.00
502130—Camshaft	1	9.50
499757—Vibration damper	1	7.50
502151—Flywheel	1	8.25
502153—Flywheel gear	1	2.00

Engine Parts—continued

503047—Piston & pin	6	$3.50
502815—Compression ring	12	.30
499634—Oil ring	6	.50
497068—Piston pin	6	.55
497067—Piston pin bushing	12	.15
487461—Pin set screw	6	.05
502129—Con. rod, less brgs.	6	2.75
502104—Con. rod bearing	12	.50
499610—Inlet valve	6	.65
499611—Exhaust valve	6	.95
499618—Valve spring	12	.20
526795—Valve spring cage	12	.10
499598—Valve spring seat	12	.06
499599—Valve key	24	.05
495462—Inlet valve guide	6	.30
494876—Exhaust valve guide	6	.30
406233—Valve lifter	12	.60
392167—Valve adj. screw	12	.10
124925—Adj. screw nut	12	.02
499678—Timing chain	1	4.50
499606—Crankshaft sprocket	1	1.50
499607—Camshaft sprocket	1	1.25
MAIN BEARINGS		
502134—No. 1	2	.70
502135—No. 2	2	.70
502136—No. 3	2	1.20
502137—No. 4	2	.80

Engine Oiling

498832—Oil pump assem.	1	6.00
495012—Pump shaft & gear	1	1.50
497232—Pump drive gear	1	1.50
525093—Pump idler gear	1	.90
498821—Relief valve spring	1	.05

Clutch

501857—Housing	1	10.50
501876—Release bearing	1	1.65
502463—Disc & facing	1	6.90
503203—Disc facing set	1	2.65
753410—Press. plate	1	3.50
753219—Cover & spring	1	6.75
1308239—Spline shaft	1	9.00
142655—Pilot bearing	1	1.15
954144—Spline shaft brg., R.	1	5.15

Transmission

1308564—Assembly	1	65.00
1310010—Case	1	11.50
1307848—Countershaft	1	1.00
1307794—CS. bushing	1	.15
1307852—CS. gear cluster	1	11.00
1308377—Mainshaft	1	6.00
1294780—Mnshft. pilot brg.	14	.35
907506—Mnshft. brg., R.	1	4.20
1307764—Low sliding gear	1	5.00
1307765—Second speed gear	1	6.00
1307805—Second speed sleeve	1	4.00
1307851—Reverse idler gear	1	4.80
1305659—Synch. drum	2	2.00
1307891—Cover	1	.35
502489—Shift lever	1	1.50
502481—Selector cable	1	2.50
1307907—Selector shaft	1	.75
502490—Selector shaft lever	1	.75
502496—Control rod	1	.25
1308073—Shift lever, low	1	.40
1308074—Shift lever, 2nd	1	.40
1307864—Shift fork, low	1	.85
1307865—Shift fork, 2nd	1	.85
1309653—Shift bar, low	1	.60
1309654—Shift bar, 2nd	1	.60

Universals

502235—Trans. flange	1	2.65
406803—Cross	2	1.25
406828—Bearing, round	4	.85
406829—Bearing, trunion	4	.90
406813—Cork packing	8	.05
501777—Pinion shaft flange	1	2.25
502233—Propeller shaft	1	5.50

Rear Axle

501988—Housing	1	15.00
231969—Cover	1	1.00
231961—Cover gasket	1	.10
502173—Diff. carrier assem.	1	60.00
501825—Diff. carrier & caps	1	12.00
501828—Differential case	1	6.00
501833—Differential pin	1	.75
499503—Differential pinion	2	1.25
499504—Diff. side gear	2	3.50
502177—Pinion & ring gear	1	15.00
501839—Pinion oil seal	1	.50
905306—Pinion bearing, F.	1	7.80
107391—Pinion bearing, R.	1	3.40
178437—Diff. bearing	2	4.50

Rear Axle—continued

412111—Grease retainer	2	$0.50
502064—Axle shaft, L.	1	7.00
954172—Rear wheel bearing	2	7.00
408638—Rear brake drum	2	4.00
502333—Lining pri.	2	1.00
502334—Lining sec.	2	1.00

Rear Springs

502672—Assembly (sedan)	2	12.00
502342—Front bolt	2	.20
499533—Shackle bushing	4	.20
495035—Shackle link, inner	2	.30
500305—Link, outer L.	1	.50
499538—Shackle pin	4	.20
126720—Shackle bolt	2	.04
500897—Spring clip	4	.30

Electrical

647D—Distributor assem.	1	8.50
824735—Distributor cap	1	.75
681M—Vacuum control	1	1.25
1871678—Contact set	1	.70
820445—Rotor	1	.20
1869704—Condenser	1	.40
538Z—Ignition coil	1	2.75
1116253—Ignition switch	1	1.25
1995006—Lighting switch	1	1.25
403936—Stop light switch	1	.40
820052—Starter switch	1	.75
1861899—Dimmer switch	1	.65
857875—Tell-tale light	1	1.80
1100003—Generator assem.	1	20.00
1857963—Gen. brush set	1	.40
1866789—Gen. armature exch.	1	4.50
812823—Comm. end bush.	1	.15
3203—Drive end bearing	1	1.15
1856310—Gen. field coil, L.	1	.90
5858—Voltage regulator	1	4.00
1107008—Starter assembly	1	20.00
811553—Starter brush	4	.10
1867897—Starter arm. exch.	1	4.50
1839345—Drive end bushing	1	.10
821523—Field coil, L.	1	.90
1873789—Starter clutch	1	3.50
917645—Headlamp, prime, L.	1	9.50
923433—Headlamp reflector	2	1.10
923453—Headlamp door, L.	1	1.00
923427—Headlamp lens, L.	1	1.50
916861—Rear lamp, L.	1	3.50
916978—Fender lamp	2	2.50
920696—Rear lamp lens	2	.50
5270316—Bat. to switch cable	1	1.00
5271257—Bat. ground cable	1	.50

Body and Sheet Metal

(4-DOOR SEDANS) (IN PRIME)

502605—Front fender, L.	1	19.95
501907—Rear fender, L.	1	9.20
503256—Hood top panel, L.	1	8.00
502974—Hood side panel, L.	1	3.75
502075—Hood grille	1	7.00
4091720—Cowl side panel, L.	1	3.00
4081958—Cowl vent. seal	1	.50
4091058—Door, stripped, L.F.	1	22.00
4091060—Door, stripped, L.R.	1	20.70
4091970—Door pillar, L. cen.	1	6.90
4091871—Quarter panel, L.R.	1	26.00
4091933—Roof panel, metal	1	28.75
4091453—Trunk lid	1	15.00
4090154—Glass regltr, L.F.	1	1.75
4090137—Remote cntrl., L.F.	1	.55
4091780—Door sill, L.	1	1.25
4091135—Door handle, lock	1	3.25
4091139—Door handle, plain	3	1.75
502119—Running board, L.	1	9.50
501962—Run. brd. support, F.	2	.50
502032—F. bumper bar	1	8.00
502028—F. bumper bracket	2	1.65
502039—R. bumper bar	1	8.00
502033—R. bumper bracket	2	1.65

Miscellaneous

502705—Hand brake cable	1	3.15
501727—Hand brake pawl	1	.20
501728—Hand brake sector	1	.75
501613—Master cyl. assem.	1	3.75
5450213—Check valve	1	.25
5450150—Check valve seat	1	.15
5450070—Master cyl. cup	1	.20
231432—Secondary cup	1	.20
5300850—Master cyl. boot	1	.35
503234—Wheel cyl., L.F.	1	2.10
231333—Wheel cyl. cup, F.	4	.20
1409133—Wheel cyl. cup, R.	4	.20
5450031—Wheel cyl. boot	8	.15
500124—Brake hose, F.	2	1.60
476719—Brake hose, R.	1	1.85
501800—Chassis frame	1	45.00
1947D—Shock absorber, LF.	1	10.50
1116V—Shock absorber, R.	2	5.50

SCUFFING
DISCUSSED BY PROMINENT ENGINEERS

"A lot of damage to rings and bores occurs during the breaking-in period and during periods of high speeds and loads."

"One . . . was scuffing of piston ring faces in new engines, particularly when started after becoming cold. In aggravated cases, this scuffing appeared on both pistons and rings."

". . . It was learned that oil, which according to the pictures in the catalogue was supposed to squirt on the cylinder wall, was doing no such thing for quite a period of time. It merely oozed out of the end of the hole, in the meantime gasoline was being supplied in liquid form to the top of the piston by choking, where more than ten sec. was consumed in cranking, the rings were washed clean of oil, so that, when the engine started and speeded, scuffing should have been expected. A lubrication change was devised which carried oil directly to the piston through the cylinder walls under pressure from the gallery line, so that, immediately when pressure was present in this line, oil started to flow to the piston surfaces. This change helped tremendously but, under the rather strenuous conditions of testing used, it did not cure."

Our Answer

"A sample of running-in compound containing Acheson's colloidal graphite – 'dag' Brand – was submitted on April 4th, 1935, for test purposes with respect to its effect on cylinder and piston ring wear in a new engine during the running - in period. Comparative tests were carried out on a plain oil and on oils containing proportions of running-in compound recommended by E. G. Acheson, Ltd An unused cylinder barrel and an unused piston ring were used in testing each lubricant and the test procedure involved repeated starts from cold, so that a certain amount of cylinder corrosion probably occurred. The results show that during the running-in period the wear with oil containing colloidal graphite was approximately half that observed with plain oil."

For and on behalf of
The R. and S. Committee of the I. A. E.
(Signed) C. G. WILLIAMS,
Director of Research.

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

dag
COLLOIDAL PRODUCTS

1939

"Thunderbolt" to Be Shown at New York World's Fair

Visitors to the New York World's Fair, which opens April 30, will see Captain George Eyston's "Thunderbolt," fastest automobile ever built, the world speed champion told MOTOR AGE the other day.

The racing giant which hung up an all-time record of 357.5 miles per hour for the measured mile at Bonneville Saltbed on September 16, will be exhibited in the British Government Pavilion.

How long the car will remain in the show was not announced by the retired British Army officer. He is scheduled for an attempt to raise his own record between July 15 and August 15, according to recent announcement of Gus P. Backman, secretary of the Chamber of Commerce of Salt Lake City, Utah, and head of the organization which governs use of the salt flats.

Most recent opinions are that Eyston will not revamp "Thunderbolt" for the scheduled assault. He feels that the biggest car ever erected for super-speed did not attain its peak in the record credited at Bonneville last fall. He told MOTOR AGE:

"I have not settled in my own mind what alterations will be necessary as the car is capable of more speed as she is."

Speed experts were divided on the plans of John Cobb, England's second contender for the world land speed title, and Ab Jenkins, America's No. 1 candidate.

While Cobb is listed by Salt Lake City race officials for an assault on the Eyston mark and renewal of the unsuccessful bid he made last fall after holding the crown for one day, no word from his London quarters have been issued in recent weeks. The secrecy, however, is characteristic of the British activity in record assaults dating back to the late Sir Henry Segrave and Sir Malcolm Campbell. At Salt Lake, Cobb is slated for his trial between August 15 and September 15.

Best advices contend that Eyston and Cobb will not return to long-distance record attempts for the present.

Persons close to Ab Jenkins say the American ace has his new "Mormon Meteor" ready for an attempt this summer to boost his long string of distance records. Jenkins is spending the winter in his home city of Salt Lake. Whether Jenkins will carry through the plan of 1938 for an assault on the Eyston straightaway mark remains problematical at present.

World Crankcase Capacity

Oil-well drillers are talking about drilling five-mile oil wells within the next five years! Already they have reached depths of nearly three miles, and they think drilling to the still lower reaches not entirely impossible when, as, and if necessary.

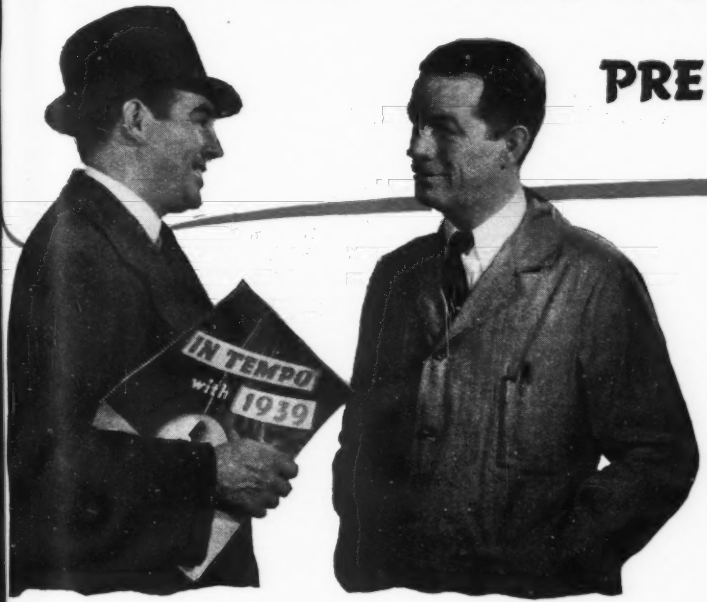
Already the deep wells are tapping oil sands which once could not be reached, and oil men are now guessing at the amount of oil to be found at the lower depths. They're willing to bet the oil is there!

Technologists are not fearful of the exhaustion of oil supplies in this country in the near future. They believe that the United States can produce all the petroleum the world can consume for many years. However, the restriction of oil production to current needs is advocated, since there is less evaporation of oil underground than occurs after the oil is brought to the surface, says the American Petroleum Institute.

Guaranteed Parts Expansion

Expansion of business, due especially to the large volume of sales developed by the "Four Star" Ignition line, has necessitated the purchase of additional plant facilities by the Guaranteed Parts Co., Inc., of New York. The new plant, located at Seneca Falls, N. Y., will be occupied shortly, according to Alex. S. Hecht, president of the company. It will house the executive offices, stock and shipping departments and provide ample space for future growth. This is the second time, within recent years, that the Guaranteed Parts Co. has had to seek more room for its activities, the first plant purchased being situated nearby in Union Springs, N. Y.

DOUBLE your BRAKE WORK
TRIPLE the PROFIT... FROM YOUR PRESENT CUSTOMERS ALONE!



Don't say: "The fellow down the street may be able to do it, but my business is different."

Hundreds of service men, whose businesses are just like yours, have already started to realize the extra profits that can be yours with the 1939 Raybestos Plan, which is individualized for *every* type of automotive service outlet.

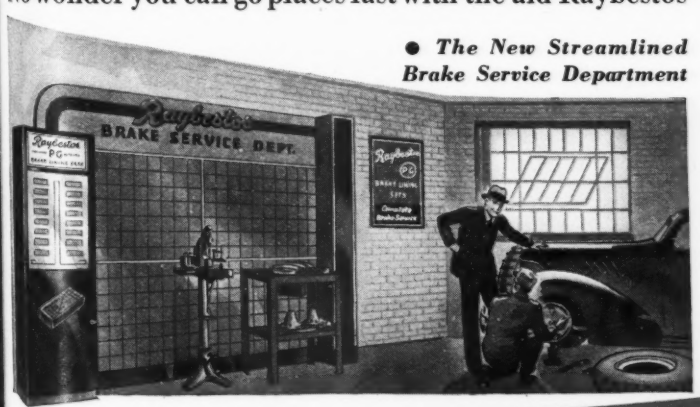
No wonder you can go places fast with the aid Raybestos offers you. You are tying up with the undisputed leader of 34 years' standing. More Raybestos lining is bought every year by *car owners* than any other brand. More car and truck *manufacturers* use Raybestos-Manhattan products for *original equipment* than any other make. You, too, will find Raybestos easier to sell at a better profit.

Powerful National Advertising

in the SATURDAY EVENING POST, LIFE and TIME will bring additional *new* customers to *your* shop, not only for brake work but for the other services you offer... when you line up with Raybestos.

Ask your jobber's salesman to show you the Raybestos Plus-Profit Plan built for YOUR business.

Raybestos Division, *Raybestos-Manhattan, Inc.*, **BRIDGEPORT, CONN.**



● *The New Streamlined Brake Service Department*

Raybestos

Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Dlvd.)	Wheelbase (In.)	Tire Size (In.)	ENGINE: No. of Cylinders, Bore and Stroke	Taxable Hp.	Piston Displacement (Cu. In.)	Maximum Brake HP. at Specified R.P.M.	Compression Ratio (to—1.)	Displacement Factor §	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	CHASSIS: Clutch Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension
1	Bantam.....60	497½	75¼	5.00/15	4-2.2x3.0	7.75	45.6	20-4000	7.00	23.0	CI	Own	Als	No	Don	Til	Buf	AL	USL	P.Ro	WG	m-UP	½ Spi	5.25	Tr
2	Buick.....39-40	996	120	6.50/16	8-3 3/32x4 1/2	30.6	248.0	107-3400	6.10	39.4	CI	LB	Ala	No	AC	Car	Wal	DR	Del	P.Own	Own	Rb-Mec	½ Own	4.44	IC
3	Buick.....39-60	1246	126	7.00/15	8-3 1/16x4 1/16	37.8	320.2	141-3600	6.25	41.9	CI	LB	Ala	No	AC	Str	Wal	DR	Del	P.Own	Own	Rb-Mec	½ Own	3.90	IC
4	Buick.....39-80	1543	133	7.00/16	8-3 1/16x4 1/16	37.8	320.2	141-3600	6.25	39.2	CI	LB	Ala	No	AC	Str	Wal	DR	Del	P.Own	Own	m-Spi	½ Own	4.18	IC
5	Buick.....39-90	2074	140	7.50/16	8-3 1/16x4 1/16	37.8	320.2	141-3600	6.25	38.0	CI	LB	Ala	No	AC	Str	Wal	DR	Del	P.Own	Own	m-Spi	½ Own	4.55	IC
6	Cadillac V8-39-61-60S	1680	126-127	7.00/16	8-3½x4½	39.2	346.0	135-3400	6.25	44.2	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC
7	Cadillac....V8-39-75	2995	141	7.50/16	8-3½x4½	39.2	346.0	140-3400	6.70	39.7	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	4.58	IC
8	Cadillac-V-16...39-90	5140	141	7.50/16	16-3¼x3¼	67.6	431.0	185-3600	6.75	43.8	CI	Mor	Ala	AC	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	4.31	IC
9	Chevrolet..Master 85	689	112¼	6.00/16	6-3½x3¾	29.4	216.5	85-3200	6.25	35.2	CI	Own	CI	No	AC	Car	Var	DR	Del	P.Own	Own	p-Own	½ Own	3.73	C
10	Chevrolet..Mas. DeL.	720	112¼	6.00/16	6-3½x3¾	29.4	216.5	85-3200	6.25	39.2	CI	Own	CI	No	AC	Car	Var	DR	Del	P.Own	Own	p-Own	½ Own	4.22	IC
11	Chrysler...Roy. C-22	1010	119	6.25/16	6-3⅝x4½	27.3	241.5	100-3600	6.50	38.1	CI°	Mor	Ala	Pur	AC	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
12	Chrysler...Imp. C-23	1198	125	7.00/16	8-3¼x4 7/8	33.8	323.5	130-3400	6.80	42.3	CI°	MW	Ala	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	½ Own	3.91	IC
13	Chrysler.Cus.Im.C-24	2595	144	7.50/16	8-3¼x4 7/8	33.8	323.5	132-3400	6.80	....	Al	MW	Ala	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	½ Own	4.90	IC
14	De Soto De L.&C. S-6	970	119	6.00/16	6-3⅝x4½	27.3	228.1	93-3600	6.50	37.4	CI°	Mor	Ala	Pur	AC	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
15	Dodge Spec.&DeL.Six	855	117	6.00/16	6-3¼x4⅜	25.3	217.8	87-3600	6.50	37.8	CI	Mor	Als	Pur	AC	Str	NS	AL	AL	P.B&B	Own	Nb-UP	½ Own	4.10	IC
16	Ford.....V8-60	665‡	112	5.50/16	8-2.6x3.2	21.6	136.0	60-3500	6.60	....	Al	Dia	CS	No	Yes	Str	Own	O	Own	P	Own	m-Spi	¾ Own	4.44	Tr
17	Ford.....V8-85	705‡	112	6.00/16	8-3 1/16x3¾	30.0	221.0	85-3800	6.15	....	CI	Dia	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	3.78	Tr
18	GrahamSpec.&Cus.96	965	120	6.00/16	6-3¼x4⅜	25.3	217.8	90-3600	6.50	....	CI	LB	Als	No	AC	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
19	GrahamSc.&Cus.Sc97	1095	120	6.25/16	6-3¼x4⅜	25.3	217.8	116-4000	6.70	....	Al	LB	Als	Fram	AC	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
20	Hudson 112....90-98	806	112	6.00/16	6-3x4 1/8	21.6	175.0	86-4000	6.50	32.4	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
21	Hudson-Six.....92	898	118	6.00/16	6-3x5	21.6	212.0	96-3900	6.25	36.3	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
22	Hudson-C.C.Six...93	995	122	6.25/16	6-3x5	21.6	212.0	101-4000	6.25	35.4	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
23	Hudson-C.C.8..95-97	1079	122, 129	6.50/16	8-3x4½	28.8	254.5	122-4200	6.25	39.2	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
24	Hupmobile...6 R-915	895	115	6.00/16	6-3½x4¼	29.4	245.3	101-3600	5.75	....	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.B&B	WG	m-Spi	½ Spi	4.27	C
25	Hupmobile Six..922E	995	122	6.25/16	6-3½x4¼	29.4	245.3	101-3600	5.75	40.9	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.B&B	WG	m-Spi	½ Spi	4.54	C
26	Hupmobile, 8...925H	1145	125	6.50/16	8-3 3/16x4¾	32.5	303.2	120-3500	5.80	44.0	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.Long	WG	m-UP	½ Spi	4.54	C
27	La Salle....V8, 39-50	1320	120	7.00/16	8-3⅝x4½	36.4	322.0	125-3400	6.25	41.4	CI	Mor	Ala	No	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC
28	Lincoln.....V12	.....	136-145	7.50/17	12-3⅛x4½	46.8	414.0	150-3400	6.38	39.0	Al	Mor	Al	Pur	AC	Str	Old	AL	Exi	P.Long	Own	m-Spi	FF Tim	4.58	C
29	Lincoln-Zephyr.....	1360‡	125	7.00/16	12-2⅝x3¾	36.3	267.0	110-3900	6.70	40.6	Al	Dia	CS	Fram	....	Str	Old	O	Own	P	Own	m-Spi	¾ Own	4.44	Tr
30	Mercury.....8	934‡	116	6.00/16	8-3.187x3‡	32.5	239.0	95-3600	6.15	....	CI	Dia	CS	.....	AC	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	3.54	Tr
31	Nash Lafay.....3910	840	117	6.00/16	6-3⅝x4⅜	27.3	234.8	99-3400	6.30	36.2	CI	Whit	Als	No	AC	Str	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.10	C
32	Nash...Amb. 6, 3920	985	121	6.25/16	6-3⅝x4⅜	27.3	234.8	105-3400	6.00	35.0	CI	Whit	Als	BS	AC	Car	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.10	C
33	Nash...Amb. 8, 3980	1235	125	7.00/16	8-3 1/16x4¼	31.2	260.8	115-3400	6.00	34.9	CI	Dia	Als	BS	AC	Car	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.10	C
34	Oldsmobile.....60	889	115	6.00/16	6-3 7/16x3 7/8	28.4	216.0	90-3200	6.20	39.0	CI	Whit	Ala	No	AC	Car	Var	DR	Del	P.B&B	Own	Rb-Mec	½ Own	4.30	IC
35	Oldsmobile.....70	952	120	6.00/16	6-3 7/16x4 1/8	28.4	229.7	95-3300	6.10	39.3	CI	Whit	Ala	No	AC	Car	Var	DR	Del	P.B&B	Own	Rb-Mec	½ Own	4.30	IC
36	Oldsmobile.....80	1043	120	6.50/16	8-3¼x3 7/8	33.8	257.1	110-3500	6.20	41.1	CI	LB	Ala	No	AC	Car	Var	DR	Del	P.B&B	Own	Rb-Mec	½ Own	4.30	IC
37	Overland-39.....	595‡	102	5.00/16	4-3 1/16x4⅜	15.6	134.2	61-3600	6.35	....	CI°	LB	Al	F-O	AC	Til	Mac	AL	USL	P.Long	WG	m-UP	½ Own	4.30	C
38	Packard Six....1700	1095	122	6.50/16	6-3½x4¼	29.4	245.3	100-3200	6.52	40.7	CI	Mor	Als	Pur	Op	CG	Wal	DR	Wil	P	Own	Nb-Mec	½ Own	4.54	IC
39	Packard Eight.1701-2	1295	127, 148	7.00/16	8-3¼x4¼	33.8	282.0	120-3600	6.41	41.8	CI	Mor	Als	Pur	AC	Str	Wal	AL	PD	P	Own	Nb-Mec	½ Own	(b)	IC
40	Pack. Sup. 8..1703-5	2035	127, 148	7.00/16	8-3 1/16x5	32.5	320.0	130-3200	6.45	43.9	CI	Mor	Als	Pur	AC	Str	Wal	AL †	PD	P	Own	Nb-Mec	½ Own	(s)	IC
41	Pack. Twelve..1707-8	4155	134, 139	8.25/16	12-3 1/16x4¼	56.7	473.0	175-3200	6.30	....	Al	Mor	Als	Pur	AC	Str	Old	AL †	PD	P	Own	Nb-Spi	½ Own	4.41	IC
42	Plymouth.....P7	726	114	5.50/16	6-3 1/16x4⅜	23.4	201.3	82-3600	6.70	35.9	CI°	Mor	Ala	No	Al	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	3.90	IC
43	Plymouth.....P8	791	114	6.00/16	6-3 1/16x4⅜	23.4	201.3	82-3600	6.70	35.4	CI°	Mor	Ala	Pur	Al	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
44	Pontiac 6.....39-25	866	115	6.00/16	6-3 7/16x4	28.3	222.7	85-3520	6.20	38.4	CI	Mor	CHI	No	AC	Car	Var	DR	Del	P.In	Own	Rb-Mec	½ Own	4.10	IC
45	Pontiac 6.....39-26	922	120	6.00/16	6-3 7/16x4	28.3	222.7	85-3520	6.20	36.4	CI	Mor	CHI	No	AC	Car	Var	DR	Del	P.In	Own	Rb-Mec	½ Own	4.30	IC
46	Pontiac 8.....39-28	970	120	6.50/16	8-3¼x3⅜	33.8	248.9	100-3700	6.20	40.9	CI	Mor	CHI	No	AC	Car	Var	DR	Del	P.In	Own	Rb-Mec	½ Own	4.30	IC
47	Studebaker..Com. 9A	965	116½	6.00/16	6-3 1/16x4⅜	26.3	226.0	90-3400	6.00	40.7	CI	Dia	Ly	Fram	AC	Str	Buf	AL	Wil	P.B&B	WG	Nb-Spi	½ Spi	4.55	IT
48	Studebaker..Pres. 5C	1110	122	6.50/16	8-3 1/16x4¼	30.0	250.4	110-3600	6.00	41.4	CI	Dia	Ly	Fram	AC	Str	Old	DR	Wil	P.In	WG	Nb-Spi	½ Spi	4.55	IT
49	Willys-48.....	555‡	100	5.50/16	4-3 1/16x4⅜	15.6	134.2	48-3200	5.70	32.3	CI°	LB	CI	F-O	AC	Til	Buf	AL	USL	P.R-B	WG	m-UP	½ Own	4.10	C

ABBREVIATIONS—General

°—Others also
•—Measured on rim of Flywheel
(1)—22 on Ford V8, 21 on DeL. Ford V8.
½—Semi-floating
¾—Three-quarter floating
††—With clearance of .015 the valve is .004 off its seat.
‡—Does not include Federal Taxes
§—Computed on basis of displacement, gear ratio, effective tire diameter, and weight with normal load.
(a)—(−¼ to +¾)
A—Above (rods removed from)
A—After top center
AA—Automatic adjuster
Ad—Advanced **Al**—Aluminum
Ala—Aluminum, Anode processed
Als—Aluminum with struts
Au—Automatic
(b)—4.36-1701; 4.70-1702
B—Below (rods removed from)
B—Before top center
Bm—Before marks on vibration damper
(c)—1−1/8, 1−1/3 **C**—Conventional
C—Cold (Tappet clearance)
Ch—Chain
CHI—Chrome Nickel Iron
CI—Cast Iron **CS**—Cast Steel
CSM—Chain sproket markings
(d)—0+0−½ (e)—0+1/16−0
(f)—1/16±1/16−0
F—Floating (Piston Pin)
FF—Full floating
H—Hot (tappet clearance)
(i)—4900-5100 **IC**—Independent coil
IT—Independent Transverse
Ly—Lynite
m—Metal with anti-friction bearings
M—Mechanical **N**—Negative
Nb—Needle bearing
(nn)—N1¼ to N2¼ on 61, N1¼ to N1¼ on 60S
(np)—N¼ to +¾ on 61, N¼ to +⅛ on 60S
(nr)—5°6′ on 61, 5°44′ on 60S
p—Plain bearing
P—Piston (Pin locked in)
P—Single plate clutch
R—Rod (Pin locked in)
(r)—Out only **Ru**—Rubber
Rb—Roller bearing
(s)—4.36-1703, 4.54-1705
(t)—½±¾−0 **TC**—Top Center
Tr—Transverse **Var**—Various
x—At 1000 R.P.M.
y—At 2800 R.P.M.

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	RINGS: No. and Width Comp.	RINGS: No. and Width Oil	Piston Pin Diameter	Piston Pin Locked In	VALVES: Head Diameter and Seat Angle: Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)	Stem Diameter (Ins.)	Operating Tappet Clearance: Inlet	Exhaust	Inlet Tappet Clearance for Valve Timing	Intake Valve Opens Before or After T.C.: No. of Degrees	No. of Flywheel Teeth	IGNITION: Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Timing: Spark Occurs °TC	No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	FRONT AXLE: Caster (Degrees)	Camber (Degrees)	Toe-In (Inches)	King Pin Inclination (Degrees)	Line Number
OM	R	125	AL-A9	2-3/32	1-1/8	29/64	R	1 1/32	45	1 1/32	45	.279	.011H	.012H	.011	19B	4 1/4B	.022	.025	TC	TC	Au	A	1 1/8	1 1/4	3	4	11	1 1/4	1/16–1/8	1 1/2	1
OH	S	112	AC-46	2(c)	2-3/16	13/32	R	1 17/32	45	1 13/32	45	.372	.015H	.015H	††	13B	5 1/4B	.015	.025	4B	1 1/2B	Au	A	2	1.21	6	13 1/4	N 1/8 ± 1/2	-1/4, +1	0–1/16	3 1/2–4 1/2	2
OH	S	114	AC-46	2(c)	2-3/16	7/8	R	1 15/32	45	1 7/16	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2 1/2B	Au	A	2 1/4	1.31	8	17	N 1/8 ± 1/2	-1/4, +1	0–1/16	3 1/2–4 1/2	3
OH	S	114	AC-46	2(c)	2-3/16	7/8	R	1 15/32	45	1 7/16	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2 1/2B	Au	A	2 1/4	1.31	8	17	N 1/8 ± 1/2	-1/4, +1	0–1/16	4 1/2–5 1/2	4
OH	S	114	AC-46	2(c)	2-3/16	7/8	R	1 15/32	45	1 7/16	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2 1/2B	Au	A	2 1/4	1.31	8	17	N 1/8 ± 1/2	-1/4, +1	0–1/16	4–5	5
BH	S	155x	AC-104	2(c)	2-5/32	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/4B	Au	A	2.46	2 3/32	7	25	(nn)	(np)	1/32–3/32	(nr)	6
BH	S	170x	AC-104	2(c)	2-5/32	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/4B	Au	A	2.46	2 1/32	7	25	0–±1/4	0–1/2	1/32–3/32	5° 1′	7
BH	S	180x	AC-104	2(c)	1-3/16	13/16	R	1.50	45	1.37	45	.341	AA	AA	AA	6B	2 1/2B	.015	.032	6B	2 1/2B	Au	A	2	1 3/4	11	30	0–±1/4	0–1/2	1/32–3/32	5° 1′	8
OH	O	....	AC-46	2-1/8	1-3/16	.865	R	1 11/64	30	1 15/32	30	.340	.006H	.013H	.006	9B	3 1/2B	.021	.040	5B	2B	Au	A	2 1/8	1 1/8	5	14	2 1/4 ± 1/2	1 ± 1/2	1/4–1/8	7°10′	9
OH	O	....	AC-46	2-1/8	1-3/16	.865	R	1 11/64	30	1 15/32	30	.340	.006H	.013H	.006	9B	3 1/2B	.021	.040	5B	2B	Au	A	2 1/8	1 1/8	5	14	0 ± 1/2	N 1/4 ± 1/2	0–1/16	4 3/4	10
LH	G	145x	AL-A7	2-1/8	2-5/32	33/64	F	1 31/32	45	1 17/32	45	.340	.010H	.010H	.014	8B	3 1/4B	.020	.025	TC	TC	Au	A	2 1/8	1 7/32	5	17	1/2–2 1/2	(a)	0–1/8	4 3/4–6	11
LH	G	145x	AL-A7	2-1/8	2-5/32	33/64	F	1 31/32	45	1 17/32	45	.340	.008H	.010H	.014	8B	3 1/4B	.020	.025	2B	3/4B	Au	A	2 1/8	1 7/32	5	19	1/2–2 1/2	(a)	0–1/8	4 3/4–6	14
LH	G	140x	AL-A7	2-1/8	2-5/32	33/64	F	1 15/32	45	1 15/32	45	.340	.006H	.008H	.011	6A	2 1/2A	.020	.025	TC	TC	Au	A	2 1/16	1	5	15	N 1/4, + 1/2	N 1/4 – + 1/2	0–1/8	5 1/4–6 1/2	15
LH	G	150y	Ch-H-10	2-3/32	1-5/32	.687	F	1.28	45	1.28	45	.279	.013C	.013C	.013	9 1/2B	3 1/4B	.015	.025	4B	1 1/2B	Au	..	1.60	1.54	4	15	8	1	1/16	8	16
LH	G	100	Ch-H-10	2-3/32	1-5/32	.750	F	1 1/32	45	1 1/32	45	.310	.013C	.013C	.013	TC	TC	.015	.025	4B	1 1/2B	Au	A	2	1.75	5	(1)	8	1	1/16	8	17
OH	R	120	Ch-H-10	2-3/32	2-5/32	13/16	R	1 23/64	30	1 21/64	45	.341	.010H	.010H	.012	4 1/2B	1 1/2B	.018	.025	TC	TC	Au	A	2 1/16	1/8	5	14	3–4	1	1/8–3/16	7 1/2	18
OH	R	130	Ch-H-10	2-3/32	2-5/32	13/16	R	1 23/64	30	1 21/64	45	.341	.010H	.010H	.012	4 1/2B	1 1/2B	.018	.025	4 1/2A	1 1/2A	Au	A	2 1/16	1 1/8	5	15	3–4	1	1/8–3/16	7 1/2	19
BH	G	115	Ch-J-8	2-3/32	2-3/16	3/4	F	1 3/8	45	1 3/8	45	11/32	.006H	.008H	.010	10 2/3B	3B	.020	.032	2 1/2B	9 1/4B	Au	A	1 13/32	1 3/8	4 1/2	12 1/2	1 1/2 ± 1/2	1–1 1/2	0–1/8	7	20
BH	G	120	Ch-J-8	2-3/32	2-3/16	3/4	F	1 3/8	45	1 3/8	45	11/32	.006H	.008H	.010	10 2/3B	3B	.020	.032	TC	TC	Au	A	1 13/32	1 3/8	4 1/2	12 1/2	1 1/2 ± 1/2	1–1 1/2	0–1/8	7	21
BH	G	120	Ch-J-8	2-3/32	2-3/16	3/4	F	1 3/8	45	1 3/8	45	11/32	.006H	.008H	.010	10 2/3B	3B	.020	.032	TC	TC	Au	A	1 13/32	1 3/8	4 1/2	12 1/2	1 1/2 ± 1/2	1–1 1/2	0–1/8	7	22
BH	G	118	Ch-J-8	2-3/32	2-3/16	3/4	F	1 1/2	45	1 3/8	45	11/32	.006H	.008H	.010	10 2/3B	3B	.017	.032	TC	TC	Au	A	1 13/32	1 3/8	7	17.2	1 1/2 ± 1/2	1–1 1/2	0–1/8	7	23
LH	G	107	Ch-7	2-1/8	2-5/32	7/8	F	1 21/32	45	1 17/32	45	.341	.010	.014	.013	2B	1/2B	.022	.028	7B	2 1/4B	...	A	2 1/8	1 1/4	6	18	.....	.....	.....	.....	24
LH	G	107	Ch-7	2-1/8	2-5/32	7/8	F	1 21/32	45	1 17/32	45	.341	.010	.013	.014	2B	1/2B	.022	.028	7B	2 1/4B	Au	A	2 1/8	1 1/4	6	18	1 1/2	1	1/16–1/8	7 1/2	25
LH	G	113	Ch-7	2-1/8	2-5/32	7/8	F	1 17/32	45	1 13/32	45	.341	.006	.013	.010	1B	1/3B	.015	.028	7B	2B	Au	B	2 1/4	1 1/4	8	21.5	1 1/2	1 1/4	1/16–3/16	8 1/2	26
BH	S	155x	AC-104	2(c)	2-5/32	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/4B	Au	A	2 1/32	2 3/32	7	....	N 1/4 – N 2 1/4	0–3/4	1/32–3/32	5° 8′	27
OM	O	105	Ch-7	2-1/8	2-5/32	7/8	F	1 11/16	45	1 11/16	45	1/4	AA	AA	AA	21B	6 3/4B	.020	.029	7B	2 1/4B	Au	B	2 1/2	2	12	32	1 1/2	1	1/16–1/8	7 1/2	28
BH	G	105	Ch-H-10	2-3/32	1-1/16	3/4	F	1.53	45	1.53	45	.311	AA	AA	AA	19 1/2B	6B	.015	.029	4B	1 1/4B	Au	A	2 1/8	1.57	5	30	4	3/4	1/16	4	29
BH	G	....	Ch-H-10	2-3/32	1-5/32	3/4	F	1 1/32	45	1 1/32	45	.310	.013C	.013C	.013	TC	TC	.015	.025	4B	1 1/4B	Au	A	2.14	1.75	5	21	8	1	1/16	8	30
BH	G	110	AL-B7-A	2-1/8	2-5/32	7/8	F	1 23/32	45	1 17/32	45	.340	.015	.015	.015	21 1/2B	6B	.020	.025	TC	TC	Au	A	2	1.42	6	20	1–2	0–1 1/2	0–1/16	7	31
BH	G	125	AC-45	2-1/8	2-3/32	7/8	F	1 3/4	45	1 11/32	45	.372	.015	.015H	.015	24 1/2B	7B	.020	.025	6B	1/2B	Au	A	2	1.42	6	16	1–2	0–1 1/2	0–1/16	7	32
BH	G	110	AC-45	2-1/8	1-1/8 1-3/16	7/8	F	1 31/32	45	1 15/32	45	.372	.015H	.015H	.015	20B	6B	.020	.025	9B	3/4B	Au	B	2	1.24	7	17	1–2	0–1 1/2	0–1/16	7	33
BH	S	151x	AC-45	2-3/32	2-3/16	55/64	P	1 9/16	30	1 27/64	45	11/32	.008H	.011H	.011	5B	2B	.020	.040	TC	TC	Au	A	2 1/8	1 3/8	5	17	0–N 3/4	1/8–1	1/8–3/16	4° 51′	34
BH	S	146x	AC-45	2-3/32	2-3/16	55/64	P	1 9/16	30	1 27/64	45	11/32	.008H	.011H	.011	5B	2B	.020	.040	TC	TC	Au	A	2 1/8	1 3/8	5	17	0–N 3/4	1/8–1	1/8–3/16	4° 51′	35
BH	S	152x	AC-45	2-3/32	2-3/16	55/64	P	1 9/16	30	1 27/64	45	11/32	.008H	.011H	.011	TC	TC	.015	.030	2B	3/4B	Au	A	2 1/8	1 3/8	6	24	0–N 3/4	1/8–1	1/8–3/16	4° 51′	36
LH	G	105	Ch-J-8	2-3/32	1-3/16	13/16	R	1 17/32	45	1 15/32	45	.373	.014C	.014C	.020	9B	2 1/2B	.020	.025	TC	TC	Au	A	1 13/16	1 1/8	4	11 3/4	3	2	1/16–1/8	7 1/2	37
H	O	110	AC-103 (z)	2-1/16	1-3/16	7/8	F	1.57	30	1 13/32	45	.340	.007H	.010H	.012	1B	1/2B	.020	.028	6B	2 1/2B	Au	A	2 3/32	1 1/4	5	15	1 1/2 ± 1/2	(t)	(e)	1° 54′	38
H	O	110	AC-103 (z)	2-1/16	1-3/16	7/8	F	1 13/32	30	1 13/32	45	.340	.007H	.010H	.012	1B	1/2B	.015	.028	8B	3B	Au	A	2 3/32	1 1/4	6	16	1 1/2 ± 1/2	(t)	(e)	1° 54′	39
H	O	110	AC-103 (z)	2-1/16	2-5/32	7/8	F	1 23/32	45	1 15/32	45	.340	.006H	.008H	.005	26B	10 1/2B	.015	.028	7B	3B	Au	B	2 3/16	1 3/32	7 1/2	22	0 ± 1/2	(t)	(e)	1° 54′	40
BPH	O	110	AC-103 (z)	3-1/16	1-3/32	7/8	F	1 41/64	45	1 11/32	45	.340	AA	AA	....	TC	TC	.020	.028	6B	2 1/2B	Au	B	2 1/2	1 1/8	10	40	(d)	1 ± 1/4	(f)	1° 30′	41
LH	G	145x	Ch-J-8	2-1/8	2-5/32	55/64	F	1 15/32	45	1 15/32	45	.340	.006H	.008H	.011	6A	2 1/2A	.020	.025	TC	TC	Au	A	1 13/16	1	5	14	N 1/2, + 1 1/2	-1/4 to + 1/2	0–1/8	5 1/4–6 1/2	42
LH	G	145x	AL-A-7	2-1/8	2-5/32	33/64	F	1 15/32	45	1 15/32	45	.340	.006H	.008H	.011	6A	2 1/2A	.020	.025	TC	TC	Au	A	1 13/16	1	5	14	N 1/2, + 1 1/2	-1/4 to + 1/2	0–1/8	5 1/4–6 1/2	43
BH	S	141x	AC-45	2-3/32	1-3/16	13/16	P	1 13/32	30	1 13/32	45	.310	.012H	.012H	.015	5B	2B	.021	.025	1-3B	1 1/2B	Au	A	2 1/16	1 3/32	6	17	N 1/2 – N 1	1/2 – 1	0–1/16	4° 51′	44
BH	S	141x	AC-45	2-3/32	1-3/16	13/16	P	1 13/32	30	1 13/32	45	.310	.012H	.012H	.015	5B	2B	.021	.025	1-3B	1 1/2B	Au	A	2 1/8	1 3/32	6	17	N 1/2 – N 1	1/2 – 1	0–1/16	4° 51′	45
BH	S	141x	AC-45	2-3/32	1-3/16	13/16	P	1 13/32	30	1 11/32	45	.310	.012H	.012H	.015	5B	2B	.015	.025	1-3B	1 1/2B	Au	A	2	1 1/16	7	19	N 1/2 – N 1	1/2 – 1	0–1/16	4° 51′	46
LH	R	105	Ch-8	2-1/8	1-3/16	7/8	R	1 15/32	45	1 3/32	45	11/32	.016C	.016C	.020	15B	5 1/2B	.020	.025	2B	3/4B	Au	A	2 3/16	1 3/8	6	14 1/2	N 1/4, + 1/2	1/2	1/16–1/8	5 1/2	47
LH	R	105	Ch-8	2-1/8	1-3/16	7/8	R	1 15/32	45	1 3/32	45	11/32	.016C	.016C	.020	15B	5 1/2B	.020	.025	TC	TC	Au	A	1 7/8	1 1/16	8	17	N 1/4, + 1/2	1/2	1/16–1/8	5 1/2	48
BM	G	87	Ch-C7	3-3/32	1-3/16	13/16	F	1 13/32	45	1 15/32	45	.371	.004H	.006H	.010	TC	TC	.020	.025	5A	1 1/2A	Au	A	1 13/16	1 1/8	4	11	3	2	3/32	7 1/2	49

MAKES OF UNITS

†—Starter Motor—Owen-Dyneto
AC—AC Spark Plug Co.
AI—AC and Industrial Wire Cloth Products.
AL—Auto-Lite
BC—Carter and Chandler-Groves
B&B—Borg and Beck
BH—Bendix, Hydraulic
BM—Bendix, Mechanical
BPH—Bendix, power operated, hydraulic **BS**—Briggs & Stratton
Buf—Buffalo Pressed Steel
Car—Carter
Ch—Champion **Del**—Delco
Dia—Continental Diamond Fiber
Det—Detroit **Exi**—Exide
Don—Donaldson Simplex
DR—Delco-Remy **G**—Gemmer
F-O—Float-o.
Ge—General Electric Co.
GED—General Electric or Continental Diamond Fiber
In—Inland **LB**—Link Belt
LH—Lockheed hydraulic
Ly—Lynite
Mac—MacKenzie Muffler Co.
Mar—Marvel
Mec—Mechanics
Mor—Morse Chain Co.
Nat—National
NS—Noblitt Sparks
O—Own **OH**—Own hydraulic
Old—Oldberg
OM—Own, mechanical
Op—Optional
Os—Own, semi-centrifugal
PD—Prest-O-Lite or Delco
Pur—Purolator
R—Ross
R-B—Rockford with Borg & Beck disk
Ro—Rockford
S—Saginaw
Spi—Spicer **Ste**—Stewart-Warner
Str—Stromberg
Th—Thompson Products
Til—Tillotson
UP—Universal Products
Wal—Walker
WG—Warner Gear
Whit—Whitney **Wil**—Willard
(z)—Or Champion **Y—4**

Clutch Trouble

Down by Flanigan's pond, Middlesex County, Mass., lives a farmer named Erskine with a sense of humor and a 1926 Graham which has been the subject of considerable correspondence in the service department of the Graham factory. Erskine first wrote the factory requesting an instruction book, but no instruction book of that vintage could be found and he was so advised. Then came the following letter:

"Thanks for your letter in which you tell me that you can't find an instruction book to go with my Paige car, Motor No. 325001 that Pete Magee of this town gave me a couple of months ago. I have relined the clutch and reassembled same. Here is what I did for adjustments. See if you follow me and can give me a friendly word of advice and encouragement.

"I set up tight on the six small bolts holding the plate to flywheel.

"I backed off on the three levers regulating bolts in center of plate in order to equalize the points of the lever which I made meet a steel knife edge placed from one spring housing to the other. Why? Because Ray Hackett of this town said they ought to be equalized.

"I then backed the bolt in foot clutch lever out ¾ of threaded part, to no good purpose as far as I can see. Now what I want you to do is to sit right down and send me a letter telling me just what I did right and what I did wrong because here's what happens when I start her up:

"A. The clutch lever comes way back before the clutch engages.

"B. The rear end gives a hell of a leap to the front.

"C. The whole ——— car trembles.

"D. Then she leaps right up in the air, like a coon dog trying to get a critter off a high limb and you have to move faster than a son of a gun, if you city fellows know what I mean, to keep her from tearing out any more of my electric fence posts.

"When she grabs, she grabs, and I mean grab. She's a sure cure for chronic laziness but I ain't authorized or licensed to go around Middlesex County curing folks so will you take pity on a hard-working, poverty-stricken dirt farmer and send along that information I crave? Also an instruction book, and may God's blessings fall heavy on you and yours.

"I live down by Flanigan's pond, first farm you come to on right hand side of road from town. Good fishing and food. We take boarders too. If you are ever this way stop in and see me."

Al Rostucher, assistant service manager who has been with Graham for more than 20 years, and who recalls the 1926 clutch vividly because it was such a strange and temperamental mechanism, wrote Mr. Erskine a full description of what to do, and the silence from Middlesex County indicates that serenity has settled once more over the electric fence posts down by Flanigan's pond.

N. Y. Regional Equipment Show

The executive committee of the Automotive Industries Association have voted to hold the third New York Metropolitan Automotive Maintenance Show, April 3, 4, 5 and 6, at the Commerce Hall, Port Authority Bldg.

Space contracts are being mailed to manufacturers at once. A number of local distributors have already signed contracts. In addition to regular attendance from the Metropolitan area it is expected that many out-of-town wholesalers will visit the show in connection with the opening of the New York World's Fair.

Heavy Duty Valve Seat Grinder

The Black & Decker Mfg. Co., Towson, Md., has developed a new heavy-duty Vibro-Centric valve seat grinder to take care of larger valves in truck, tractor and Diesel engines. This new unit retains all the patented features of the standard Vibro-Centric and offers in addition more speed, more power, greater capacity and a wider range of operation, it is claimed. A new heavy-duty stone dressing stand and a ball bearing stone sleeve have also been announced, incorporating among its new features a micrometer diamond feed, a horizontal adjustment for various stone sizes and for vertical or horizontal cutting, and an improved angle indicator which is more easily read and set.

Exide Dealers of long standing tell what keeps the Exide Proposition out in front . . .

THE WAY to judge an automotive product and the merchandising program behind it is to look at its record and see what it's done for the trade. Thousands of dealers have been cashing in with Exide year after year, and seeing their business grow larger every season

The reason is that the Exide Proposition is always out in front, always built around the automotive needs of the day. And that's on the word of experienced dealers.

What the Exide Proposition is doing for Exide Dealers of long standing it can do for you—starting today. See your Exide Wholesaler, or get in touch with us.

Here is what a few of them say:

"Your recharge and rental merchandising plan has brought us a nice volume of new business, and our battery departments are showing continual increases from year to year." —Mr. B. R. Miller, Miller Service, Inc., Atlanta, Ga., an Exide Dealer since 1929.

"Exide batteries and Exide merchandising methods have helped us build a real battery business. Sure-Start Service has played a large part."—Mr. Jos. Tomkinson, Diamond Tire Sales Co., Inc., Minneapolis, Minn., an Exide Dealer since 1929.

"You can't be in the shop all the time. It's when I'm away and have to depend on the men to sell batteries that the Exide Automatic Vendor helps most. The boys certainly do a nice job of selling with it."—Mr. A. C. Zacher, Zacher Tire Service Co., Inc., West Medford, Mass., an Exide Dealer since 1934.

"In the gasoline business today, we are required to render many services. This keeps us busy, and we are always on the lookout for short-cuts. The complete Exide proposition, such as we have at our station, fills the bill. Exide certainly knows what we fellows are up against, and has given us something to work with."—Mr. Edward Kallif, Morris Ave. Gas Station, New York City, an Exide Dealer since 1935.

"Once in a while we have a tough price situation to meet, but we never have to argue about quality. Everybody knows Exide is good."—Mr. A. J. Champion, A. J. Champion Tire & Battery Service, Highland Park, Mich., an Exide Dealer since 1927.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

The World's Largest Manufacturers of Storage Batteries for Every Purpose

Exide Batteries of Canada, Limited, Toronto

TUNE UP

(*Continued from page* 13)

to look for leaky pumps and radiators, rusted mufflers and exhaust pipes, broken spring leaves and worn shackles, loose bumpers, shredded fan belts, defective brakes and oil pan seepage? Do they call these things to the attention of the owner and try to sell a job for the shop? Well, then, you'd better give them a little course in salesmanship.

Does your gas pump man wear a clean uniform and keep a friendly smile on his face at all times? Does he take note of cars that are using too much oil and try to sell the owner on a ring job? Or give you the man's name so you can go to work on him by personal call or mail? Does he try to sell a wash job to the driver or the muddy car, or a wax job on the car whose finish has been neglected? Well, get busy and jack him up about it.

When a car comes in for battery service do you examine the cables and see how the starting motor sounds? Do you look at the ammeter and see if the charging rate is right? Do you turn on the lights and look for cracked lenses or blackened bulbs?

Do you talk motor tune-up to owners that are in your shop for other reasons? You'll be surprised how many extra jobs can be landed by showing and explaining your equipment to car owners. Whenever you or one of your men see something on a car that will need attention soon do you go out of your way to tell the customer about it? There's psychology in that because it will worry him until he comes back and lets you fix it.

While you're about this job of tuning-up your business listen to the way your employees address your customers. Even the down-at-heel driver of the remains of a Model T likes to be treated politely. If you don't want a customer's trade tell him so frankly; if you want his patronage give him courteous treatment, but don't over do it. Get too friendly with a customer and before you know it he'll be chiseling you down on your price. Keep customer relations dignified and on a business basis. These glad-hand, back-slapping type of customers are too often a bad credit risk.

Train your help to always call or speak to a customer by his right name —if they happen to know it. If not, then train them to say, "This gentleman wants the price on a battery . . .", or, "Is this gentleman's Buick sedan ready?" Never let your employees refer to a customer when he happens to be present, as, "this man," "this fellow," or "this guy." It's bad for your business, and it sounds lousy.

While you're at this job of tuning-up the shop you might as well get busy and haul out all the accumulated trash. There's no use in keeping the space under the benches littered with junk parts. Junk parts belong in the junk yard; you'll never want to use them because you know you can only make junk profits with junk parts. It's all right to keep a few worn out items around to show customers what a horrible example looks like, but have all the rest shoveled out. And after you get the floor and corners clean how about some paint or whitewash for the walls. The saving in electric light bills alone will probably pay the cost, and you and the customers will get better work as a bonus.

Methods of keeping up stock is one place where nearly every business can do a little tuning-up. If you think back you'll probably remember where you've lost plenty of sales by finding that the article you've just spent ten minutes in selling to the customer happened to be "out of stock." Being fresh out of something doesn't help business a bit, and makes the customer trot around to your nearest competitor.

The perpetual inventory system of maintaining a parts stock is fine for the large business, but it's too top heavy for the small shop. Yet stock shortage is just as disastrous for the small shop as for the large. Where everybody is drawing parts from stock and there is no parts boy in charge conditions are bound to get in a mess unless a simple system is devised. After a number of trials our shop finally solved this problem of keeping stock by the simple expedient of buying a large blank book.

This book is kept on the show case and every time a man takes a part from stock he is required to write the part number and name in this

book. Just before closing time each night the days' list is checked and all parts that must be secured from a distance are ordered by mail. Parts that can be secured from the local jobber are left unchecked until the jobber's salesman calls around. Knowing the system the jobber's salesman comes in, reaches for the book, and copies off his order. This system really works out and, unless some items are back ordered on us, we rarely have to tell a customer, sorry, but no stock.

When it comes to tuning up a business from the financial angle we find that too few shops take advantage of that little phrase at the top of most wholesale accounts—"2% 10 days, 30 days, NET." Yet in the course of a year that can mean some important money to a shop doing even a fair volume. Suppose, just for instance, that your average purchases from your jobber total an average of $500 a month. If you pay for what you buy every ten days instead of once a month, it means that you can save exactly $10 per month on discounts. That's $120 a year, and it will buy you a lot of things you want, including two hats for the missus that you see no need of.

Keeping local bills with other shops and store paid up—and making them pay their bills to you — is another thing that goes along as part of your business tune-up. Too often the tendency is to allow cross accounts — you owe them and they owe you—to run on indefinitely. After a year or so no one remembers what it's all about, arguments arise when at last a settlement is forced, and sometimes a fellow who owes you more than you owe him folds up. Anyway you take it you stand to lose, and good business dictates that you settle up—and make the other man do the same — at the end of every month.

Anyone who has tried to get the money on old accounts knows that the older a bill is the harder it is to collect. Knowing this to be a fact the thing to do is to collect 'em while they're young. Make every effort to get bills paid before the end of the second month rolls around, because the longer you let them ride the harder you're going to work and the more you're goin to lose. If you can't get it all get half, if you can't get half take ten per cent, if you can't get ten per cent get a definite promise. And if you get a promise follow it up, be there on time and don't be so tender-hearted. Don't be afraid of making a customer sore by making him pay up. He'll forget all about it in a few days, and he'll be back to see you. The bird that won't be in to have work done is the man who owes one.

A few years ago I took over the management of a shop that had $9,000.00 worth of old accounts on the books. The business was short of cash and I needed all of this money that it was possible to get in order to buy new equipment and build up the stock. Looking over the age of most of these accounts gave me a hopeless feeling. A good many were outlawed by time limitations, and from what I could learn about this group of debtors they were a pretty hard-boiled lot. I realized right at the start that if I went out after this money it would take most of my time. I probably wouldn't get in much cash, and I wouldn't be able to devote enough time to getting the shop reorganized and running smoothly.

Faced with these old accounts, I got the idea that the right type of girl as the collector might whittle down these accounts. I interviewed a half a dozen applicants for the job, and at last found one of the kind I had in mind. She was a little thing with a delicate complexion, soft eyes, and you just knew that one cross word would bring out the tears. I took her on trial and sent her out to call on the slow payers and deadbeats. She made seven calls the first morning and came back with three checks in full, fifteen dollars in cash and two hot promises. I hired her steady. Within six months that girl collected almost $6,000 of the old accounts, and kept the current bills coming in without any trouble.

This business of keeping a shop tuned-up and on its toes is a full-time job. I see some shop owners that take plenty of time off to play golf, go fishing or hunting, and I wonder how long it will be before they have no shop to worry about and full time to sit on a bench and look worried. Running a repair business is like running a car, you can neglect either one for a time, but sooner or later you're going to have to give them a tune-up or call in the junk car buyer or the sheriff.

McAleer Promotes Combination Package

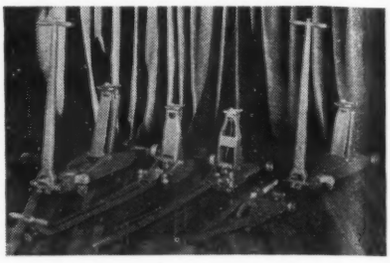
According to C. H. McAleer, president of the McAleer Manufacturing Company of Detroit, giving the customer a polish that will restore luster to an automobile is only half the manufacturer's duty to his customers. He should also urge the car owner to apply a protective coating to preserve this luster once it has been produced.

To promote this idea of "polish and protect" the McAleer Company is featuring a special combination package which includes a 30c can of McAleer Quick Wax with a regular 50c pint

of McAleer's Liquid Polish and Cleaner. Unit is packaged in a colorful counter-display carton.

Ajax Has New Line of Service Jacks

The Ajax Auto Parts Co., 15th St. and C.&N.W. R. R., Racine, Wis., has announced a complete line of service jacks, added to those already manufactured by the company. The line now consists of a four ton and a two



ton hydraulic service jack, a one and one-half ton and a two ton hydraulic curb jack, and a one ton mechanical curb jack with folding handle.

Sterling Takes Over Fageol

Effective Nov. 1, 1938, the Sterling Motors Corp. of Milwaukee acquired the assets of the truck division of the Fageol Truck & Coach Co. of Oakland, Cal.

A Sterling factory branch was to be opened at 470 Bayshore Boulevard, San Francisco, on or about Feb. 1 to serve both Sterling and Fageol owners in Northern California and the Pacific Northwest. For the time being, sales and service are handled from the Fageol factory at Oakland.

As of Jan. 1, 1939, the manufacture of Fageol trucks was discontinued, although a complete stock of service parts for all model Fageol trucks will be maintained at all times.

Olds Transmission

(*Continued from page 22*)

replacing this ring always use a new ring and replace with special tool as shown in Fig. 4.

Remove transmission rear bearing snap ring, then remove the main shaft and bearing from housing by pounding rear end of shaft on a wooden block, Fig. 5. Remove bearing thrust washer, speedometer drive gear and spacer from shaft by removing bearing snap ring in back of bearing with special tool and then pressing off bearing and gear, Fig. 6. Note the shielded side of the bearing is toward the front of the transmission. Make sure that the oil seal is in good condition and that the surface on which the oil seal runs is smooth.

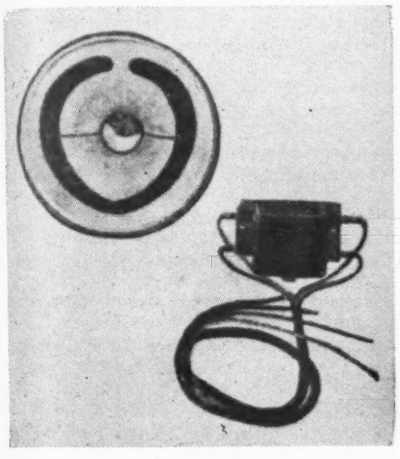
The transmission rear bearing housing on Olds models G and L is much longer than on the F models, consequently a Durex bushing is used at the rear of this housing to support the transmission main shaft. If a new bushing is necessary, the old one can be pressed out of the housing by means of a press and a special tool.

To disassemble the main drive gear assembly, remove the high speed synchronizing drum by prying the retaining ring over the shoulder of the gear. Remove the snap ring and spring washer holding the bearing inner race on the shaft. Remove bearing by jarring shaft on block of wood or piece of lead.

Device Eliminates Headlight Glare

As a result of research and experimental work, Stam-O-Lite, Inc., automotive lighting engineers, Pure Oil Bldg., Chicago, Ill., has developed a device which is said to eliminate the glare producing filament images in the conventional headlight reflector and permit only diffused glareless filament images to be projected. The manufacturer claims that this device, properly installed in the reflector, permits the reflected light to penetrate through, fog, rain, sleet, snow and dust. It consists of a ring which blocks out the zone of glare producing filament images in the reflector.

With the elimination of glare, it is possible to increase the candlepower



output of the headlight bulb and provide better road illumination. This is accomplished, according to the manufacturer, by the installation of a relay which steps up the power of the headlight bulb to its full capacity of 32 candle power. It is claimed that, with the present wiring system of automobiles and trucks, the candlepower of ordinary headlights is sometimes cut as much as 75 per cent.

Complete information regarding this product, selling helps, prices and quantity discounts, write the manufacturer.

Turner Brass Representatives

W. S. "Red" Gardner, Chattanooga, Tennessee, and A. L. Meredith, Miami, Florida, have been appointed manufacturers' representatives for the Turner Brass Works, Sycamore, Ill., in the ten southeastern states. Meredith covers Florida, Georgia, South Carolina, Alabama, Mississippi and New Orleans, La., while Gardner covers Tennessee, North Carolina, Kentucky, West Virginia and Virginia. They will sell Turner's complete line of blow torches, firepots, camp stoves, pressure lamps and lanterns, water heaters, soldering coppers and metal spray guns to the hardware, mill plumbing and automotive supply jobbers.

Plan New Penna. Track

Pennsylvania auto racing fans will be offered a semi-monthly speed show on a new $50,000 mile track at Williams Grove park, near Harrisburg, beginning in mid-May, according to plans tentatively approved by the AAA Contest Board, national governing body of the sport.

Ten Allen, secretary of the Contest Board, said the backers of the project, which will also offer horse racing, list May 14 as the probable opening date. Present specifications provide for erection of electric lights for night racing.

A new grandstand will accommodate some 6000 spectators. The straightaways will be seventy-five feet wide and will expand an additional fifteen feet on the curves.

Petition of the operators for the AAA sanction began more than a month ago and received approval of the Contest Board secretary the other day following a complete study of plans.

Economy Run

(*Continued from page* 36)

The entrants this year ran under extreme difficulties which reached such a hazard that within 42 miles of the finish of the course, the forest ranger halted all cars and ordered drivers to apply chains. From the sprinkle of rain which fell as the cars left Gilmore Stadium on Hollywood boulevard at the start, each mile brought new difficulties in battling the weather. Slippery highways, fog, strong winds and snow kept the drivers alert at every stage. The run ended at a 4000-ft. altitude, 3700-ft. above the start, in Los Angeles.

Mileage

(*Continued from page* 19)

on the condition of all of these parts.

Getting more gasoline mileage and better performance means that the service man will check the exhaust system for restrictions. Sometimes a tail pipe is partially clogged by foreign matter, or it may be kinked. Mufflers, too, wear and rust out which often results in some of the interior parts becoming loose or dislodged in such a way that there is excessive back pressure. There is considerable chemical action on the parts of the muffler and in cars over a year old this part should be checked if there is complaint of low mileage.

About carburetor adjustment, let it be said that any carburetor, especially those on the later model cars, can be adjusted or made to meet the requirements for all speeds and conditions. Assuming that the carburetor is up to standard, which means that the fuel level is correct, that the idle or low speed screw is adjusted correctly, that the high-speed system is working properly, the accelerating pump works and that the choke mechanism is in order, then both power and economy are possible.

Reference to the chart, Fig. 2, shows how the carburetor mixture affects mileage. The normal range of air-gasoline mixtures, lies between 12.5 pounds of air to 1 of gasoline to a little over 15 pounds of air to 1 of gasoline. Below 12.5 to 1 the mixture is too rich, while above 15 to 1, it is too lean. The chart shows that the best mixture for part throttle gives about 22.5 miles to the gallon assuming a car speed of 30 miles per hour. For power when the throttle is wide open, a richer mixture is desirable, namely, 12.5 to 1.

Although various things in the ignition system like the battery cables, coils, breaker points, distributor, spark plugs and others affect miles per gallon, one of the most important is the timing of the spark in the cylinders. A properly advanced spark greatly improves fuel mileage, especially if good quality gasoline is used which permits the greatest spark advance before "detonation" occurs. Too great a spark advance, on the other hand, wastes power and gasoline mileage will suffer. Note in Fig. 3, that there is a steady rise in miles per gallon with an advance of the spark. In addition, a car traveling about 30 miles per hour for example, with the spark occurring at top dead center will give about 19 miles to the gallon. If the spark is advanced 20 degrees, the miles per gallon is increased to about 20.7. Acceleration is also bettered with proper spark advance.

High speed driving takes its toll of gasoline. Not many car owners realize how rapidly the curve of gasoline mileage drops when they consistently drive with a "lead foot." Fig. 4, tells the story. The upper curve is the miles per gallon a car should obtain with a mixture ratio of about 15 to 1. The lower curve represents the mileage with a power mixture of 12.5 to 1 and the engine is operating on a power mixture, of 12.5 to 1. Obviously when the throttle is wide open and the engine is operating on a power mixture both curves come together. Besides, the miles per gallon drops to about 5 at around 100 miles an hour. Carburetors generally are equipped with some sort of "economizer" which lean out the mixture through the speed range. The dark area between the two curves of Fig. 4, represents the saving produced by this economizer action.

Mileage is rapidly reduced when the tire pressure is reduced. At 30 miles an hour, for example, there is a difference of 2 miles per gallon with tires at 15 pounds as against 35 pounds. At 60 miles an hour there is a little over 1 mile per gallon saving between tire pressures of 15 and 25 pounds. Soft tires also make the car sluggish during acceleration and more throttle opening is required, materially affecting fuel economy.

The region we live in has something to do with gasoline mileage. A mile above sea level brings about problems that do not exist at sea level. We have already seen that high compression is a decided advantage in engine performance and especially as regards gasoline mileage. But in high altitudes the atmospheric pressure is lower and therefore the actual compression pressures in the cylinders are lower. If all the other factors governing gasoline mileage, like ignition, carburetion and so on are correct there is little the service man can do about high altitudes unless he installs a higher compression head or resorts

to some form of supercharging. At 60 miles per hour there is a difference of nearly 4 miles to the gallon for a car going 30 m.p.h. at sea level as against one 7000 feet above sea level.

The betterment in gasoline mileage and resultant smoother and more powerful engine performance possibly by an analysis of the exhaust gas with proper instruments is shown in Fig. 5. When the car was brought into a service station the exhaust gas analyzer records the curve No. 1. It will be seen that this car gives its best mileage performance at over 45 miles per hour. At 20 miles an hour the engine was only about 73 per cent efficient, as regards combustion of fuel. This engine was given a tune-up and curve No. 2 was the result. However, the low spots A and B, in the curve are objectionable and further analysis showed that A, was due to an incorrect relationship between the throttle and the idling system of the carburetor. Low spot B was due to the metering rod of the carburetor lifting out of the metering jet too soon, so that far too much gasoline flowed through the jet. In addition to affecting gasoline economy these low spots produced irregular engine performance. Low spot A made a "flat spot" or jerk when the engine was accelerated. After bringing the carburetor up to standard and setting the ignition correctly, curve 3 resulted, which is a normal curve of performance and productive of the most miles per gallon for all-around operation.

Willys Appoints Frazer

J. W. Frazer

The appointment of Joseph W. Frazer as president of Willys-Overland Motors, Inc., has been announced. Mr. Frazer was for 15 years identified with the Walter P. Chrysler interests in the development of the Maxwell and Chrysler organizations.

With the Chrysler interests he was vice president of the Chrysler Sales Corp., of the Chrysler sales division, Plymouth Motor Corp., DeSoto Motor Corp., and previously was associated with the Pierce-Arrow Finance Corp. Mr. Frazer held an executive position with the General Motors Corp. in its Chevrolet division, export division, and the General Motors Acceptance Corp.

New Factory for Hoof

Having outgrown their quarters near Chicago's loop district, the Hoof Products Company have moved to their recently purchased factory and office building located at 6543 South Laramie Avenue, Chicago, where operations began January 1.

Principally responsible for the expansion program are the company's latest innovations—Hoof Brake Eyes, an automatic safety valve lock-out for hydraulic brakes, and Hoof Fuel Economizer Units for governor equipped Chevrolets and Fords. In addition to these new products, they manufacture Hoof Cantilever Spring Governors.

Color Campaign

A broad and intensive personal and advertising sales drive to promote spot repair and repainting jobs for body shops was announced at the annual sales meeting of the Automotive Finishes division of the Martin-Senour Co., pioneer Chicago paint manufacturers.

Salesmen from all parts of the country met at Chicago's Hotel Windermere to discuss new product developments, to sit in on a preview of the new 1939 motor car colors, and to discuss ways and means of educating all automotive service divisions on the money to be made out of the heretofore somewhat neglected paint shop.

Announcement was made of a new Martin-Senour Silvery Chrome finish for either brush or spray-gun work which has proved in extensive west coast tests to be a promoter of spot repair and repaint business.

Colorful advertising material for window or interior display was presented, together with a unique label development which gives the painter the intermix formula on the can to facilitate any shading necessary due to weathering of the original finish.

Catalogs, etc.

(Continued from page 34)

comprises 56 pages and cover, attractively displaying the Black & Decker line. A number of new tools are listed for the first time, among them being the new 3/16 in. Hornet Drill, the 5/16 in. Ball Bearing Utility Drill, and the new No. 36 Portable Electric Hammer. The Black & Decker Mfg. Co., Towson, Md.

The Van Dorn Electric Tool Co., Towson Co., Towson, Md., now has ready for distribution its new 1939 catalog of Portable Electric Tools and accessories. The new catalog covers the entire Van Dorn line of 114 different portable electric tools and accessories. Many new refinements in design and construction will be noted, as well as several entirely new items.

The Chek-Chart Corp. of Chicago has just issued a completely new 1939 Chek-Chart Automotive Lubrication Guide, which contains factory-approved lubrication diagrams on all cars produced during the last six years, as well as popular light truck models.

The new book is spiral bound and has a large page size of 10¼ x 13½ in. that makes it easy to read and use. The lubrication diagrams are very simple in arrangement and are printed in two colors, red and blue, on a durable white paper stock. These diagrams provide a complete routine for every lubrication job, together with detailed instructions as to the type of lubricant required for each lubrication point and the mileage interval at which it should be applied.

This newest Chek-Chart is available on an annual subscription basis, which keeps it right up to date through monthly lubrication bulletins for the entire calendar year, and the price is $12.00 each, f.o.b. Chicago, Illinois.

Titled "High-Speed Combustion Engines," the tenth edition of what was originally known as "The Gasoline Motor" has been announced by the author, P. M. Heldt, Nyack, N. Y.

The new edition has been completely revised; obsolete matter has been eliminated, replaced by new material dealing with recent advances in engine design and new methods of production. New chapters have been added on carburetors and ignition equipment, subjects not covered in previous editions. There is a new chapter also on combustion-chamber design and on the related subjects of detonation and roughness. The extent of the revision is indicated by the fact that there are 26 chapters instead of 22 as in the ninth edition, and 500 illustrations of which approximately 150 are new. Large-scale sectional assembly drawings of a considerable number of engines of different types, including some of the very latest, are combined in the plate supplement.

P. M. Heldt, a recognized authority on the internal combustion engine, has been prominent in automotive engineering circles since the beginning of the industry. He is a member of the Society of Automotive Engineers, and Engineering Editor of Automotive Industries.

The Atlas Press Co. general catalog for 1939, released in January, presents complete information on Atlas lathes, shapers, drill presses, arbor presses, and shop equipment. Twenty-four of its 72 pages are devoted to the new 10-inch Atlas lathes with power cross feed. Copies are available from Atlas Press Co., Dept. 7, Kalamazoo, Michigan—Ask for Catalog No. 39.

Solder Seal Offers Two New Products

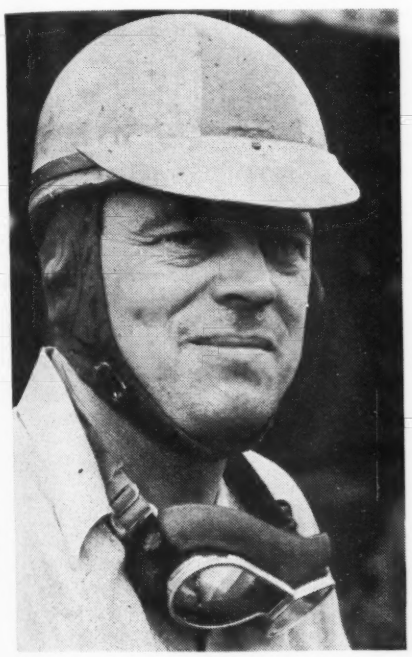
Radiator Specialty Co., Charlotte, N. C., makers of Solder Seal products, have announced two new products: Titeseal, a gasket and joint-sealing compound, and Block Weld, a product for repairing cracked cylinder blocks, cylinders, valve ports and water jackets.

Titeseal is claimed to be flexible, non-hardening and heat-resisting material for sealing gaskets and other joints about the engine. It is packaged in a special Shop Kit including light, medium and heavy grade, and a spreader. For a limited time the manufacturer is offering a one-dollar can of Block Weld free with each Titeseal Shop Kit priced at $1.20 Net to dealers.

"Spunk" Collins Named 1938 I.M.C.A. Champion

Emory "Spunk" Collins, one time hockey player, was declared 1938 dirt track champion at the annual December meeting of the International Motor Contest Association in Chicago. In winning the I.M.C.A. title the Le Mars, Iowa, star nosed out the former champion, Gus Schrader, by a mere 100 points in one of the most hotly contested seasons in I.M.C.A. history.

During 1938 John Sloan, Jr., promoted 76 days of races sanctioned by the I.M.C.A. while 85 days had actually been contracted for, eight of which were rained out and the September east coast hurricane elimi-



Emory Collins

nated the Eastern States Exposition sweepstakes at Springfield, Massachusetts.

Collins set a new world's record for a one mile dual purpose track at St. Paul, Minnesota, when the electric eye clocked him at 38:10 seconds. Gus Schrader hung up a new record for a flat half mile fairground track when he eased around the Cedar Rapids, Iowa, track in 25:23 seconds. This record is not to be confused with the half mile record that Spider Webb set last September for the highly banked Winchester, Indiana, Speedway.

Gasoline Consumption Increases for Farm Use

A tremendous increase in the use of gasoline on farms during the last three years is indicated by gasoline consumption figures now available for the years 1935, 1936 and 1937 from the United States Bureau of Public Roads. In the 35 states for which data are obtainable the total increase in gasoline consumption for non-highway purposes, which means mostly farm use, amounted to 435,968,000 gallons, an increase of 50 per cent. In 1935 gallonage amounted to 903,866,000. In 1937 it rose to 1,349,834,000 gallons.

This increase was even more impressive in the country's principal tractor farming states. Of the 17 states in this group, the 14 for which comparative figures are available had a total gallonage in 1935 of 647,339,000. In 1937 this figure rose to 1,084,817,000, or an increase of 67 per cent.

Certain individual tractor states showed enormous increases during the three year period. Gasoline consumption for non-highway purposes in Michigan jumped 127 per cent. Oklahoma was right behind with an increase of 110 per cent. Ohio followed with a rise of 99.6. Iowa and Illinois showed identical increases — 87 per cent.

Farm experts say there are three specific reasons for these large increases: (1) the rapidly growing increase in the sale of high-compression, or gasoline-burning tractors; (2) a growing preference of the farmer for gasoline as a fuel because of its easier starting, easier idling and increased power; and (3) introduction of rubber tires for tractors, which has enabled farmers to use their machines on hard surface roads.

Figures for 1938 are not yet complete, but preliminary reports indicate a continuing increase. For example, unofficial figures for Oklahoma show that the amount of gasoline used by tractors in that state increased 37 per cent in the first six months of this year over 1937.

United Motors Creates Merchandising Dept.

W. N. Potter, general sales manager, United Motors Service, announces the creation, as part of the sales department, of a merchandising department under the direction of Merritt D. Hill, former assistant general sales manager. L. W. Martin, manager of the New York branch, has been promoted to Mr. Hill's former position at the general offices.

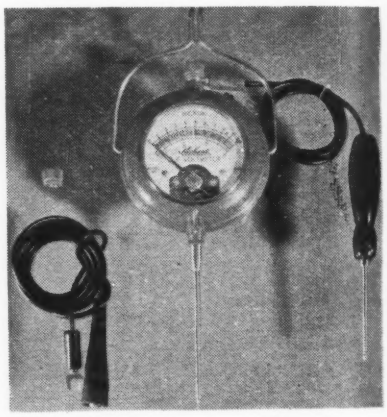
Mr. Hill will be assisted by the following experienced merchandising managers, at general offices, each assigned to specific lines: J. G. McLean, Delco-Remy & AC Service Parts; S. H. Hilleboe, Hyatt and New Departure Bearings; H. H. Sullins, Delco Batteries; H. B. Smith, brakes, radiators and shock absorbers; and T. O. Warfield, auto accessories and radios.

W. A. Plumer, manager, electric motor sales, general offices, has been promoted to assistant general service manager. Mr. Potter also announces the formation of a Sales Promotion Department which is being headed by Mel G. Beremand.

The following branch office assignments have been made: H. P. Schaller, manager of the St. Louis branch to manager of the New York branch; D. C. Shaw from manager of the Buffalo branch to manager of the St. Louis branch; and H. S. Staton from sales manager of the New York branch to manager of the Buffalo branch.

Dual-Range Voltmeter

Through its regular jobber distributing channels the Packard Electric Division of General Motors Corp. has made available a new precision-built dual-range voltmeter for service stations, garages and repair shops. The unit combines a high-reading and low-reading scale—0 to 3 volts, and 0 to 10 volts. A push-button at the top of the instrument controls the range



within which the pointer operates, and it is claimed to be accurate within 2 per cent of total scale reading. In addition to the regular lead with prod, two extra 6-ft. leads with bull-dog and spade terminals are included for using the instrument between widely separated parts of the car.

Rubber Dressing

A new tire and rubber dressing has been announced by E. H. Stackhouse, 219 N. 63rd St., Philadelphia, Pa. Designed to be used on tires, running boards, floor mats, batteries, belting and all other rubber products, it is claimed that this dressing does not dry or harden while being applied, and will not rub off or crack after it has been applied. It leaves the rubber a black lustrous color with a smooth, even finish. Another feature claimed by the manufacturer is that it does not run or smear, and cannot dry or turn rancid in the can. Sample will be supplied upon request.

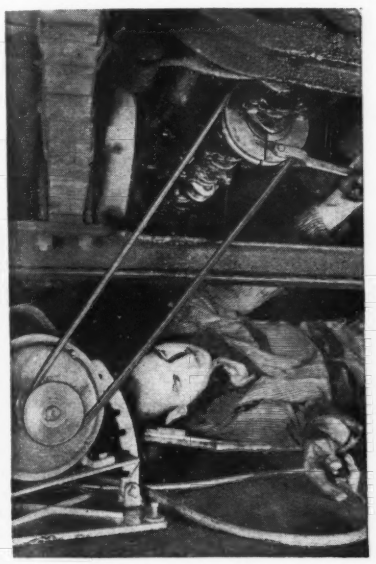
Dayton Track Rebuilding

Changes in the Dayton (O.) Speedway, recently purchased by Frank Funk, veteran operator of races through Ohio and Indiana, will be completed early in March, it was estimated by officials of the Central States Racing Association, under whose sanction the races will be run.

Cutting the course from five-eighths to one-half mile, the track is being converted into a high bank oval similar to the Winchester (Ind.) Speedway. Dirt is being piled high for the bank and a hard composition surface will be placed. The track will operate night events through the summer after its spring day-time opening yet to be scheduled.

Grinds Crankpin in the Car

Lempco Products, Inc., Bedford, Ohio, has announced a new portable crankpin grinder which can be used to turn down the crankpin without removing the crankshaft from the engine. Being portable, it can be set up anywhere that a 110 volt current outlet is available. This equipment makes it possible for the small shop as well as the fleet-operated shop to perform this heretofore difficult and

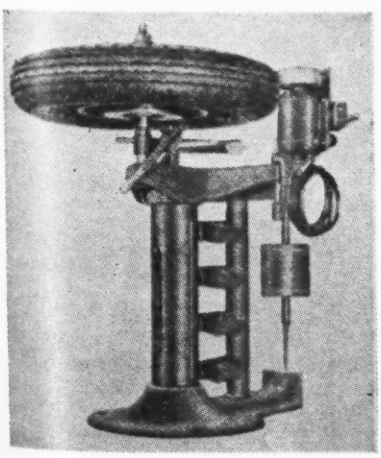


expensive operation easily and quickly, and with a minimum of expense.

Equipment can also be used in convenient bench mounting brackets supplied with standard equipment, or in the block for jobs in which the block and crankshaft have been removed from the vehicle. For complete information and prices write Frank J. Schwab, equipment sales manager, Lempco Products, Inc.

Bean Announces New Wheel Balancer

A combined static and dynamic wheel balancer has been developed by John Bean Mfg. Co., Lansing, Mich. The wheel is balanced statically by placing it on a pendulum scale which indicates the point at which weights are needed. Dynamically it is balanced on a vertical spindle on which it is rotated by a driving pulley of a small electric motor. The unit is supplied complete with trays for weights, face plates, tool board and tools. A demonstrator is also available to aid in merchandising this service. For complete information, write the manufacturer.



P & D Magneto

The "Super Chief," a completely sealed magneto, is the latest item to be announced by the P. & D. Mfg. Co., 1902 Steinway St., Long Island City, N. Y. Neither dust, oil nor other foreign matter can penetrate the housing of this magneto, the manufacturer claims, and it is recommended for all tractors and for use in oil fields, on excavation and major construction jobs and for all uses where extremely severe service conditions are encountered.

Barcalo Promotes G. N. Abt

The Barcalo Manufacturing Co., Buffalo, N. Y. makers of wrenches, pliers and other drop-forged tools, announces the promotion of Gerald ("Jerry") N. Abt to the position of field sales manager. Mr. Abt, who formerly served in the capacity of assistant secretary, will have direct supervision of the men in the fields, working with them and assisting Mr. A. W. Kirton, secretary and treasurer in determining matters of general tool policy.

Weaver Announces New Wheel Balancer

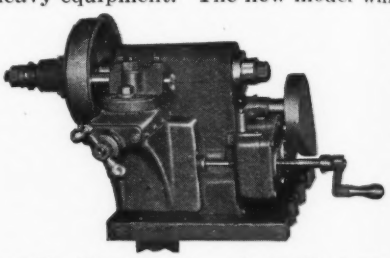
The Weaver Mfg. Co., 2177 S. Ninth St., Springfield, Ill., has developed a new wheel balancer which balances the wheel in motion. With this new unit, the wheel is placed on the spindle and rotated by an electric motor. The operator then moves two hand levers which control a counter-balance weight that offsets the effect of dynamic unbalance in the wheel. One lever tilts the counter-balance forward or backward as required, and the other moves the counter-balance around the spindle in the direction of wheel rotation. When the pointer on the instrument stands absolutely still it indicates that the wheel is in balance. Then the wheel is stopped, and the operator applies wheel balancing weights to the rim at the position indicated by the counter-balance weight. The correct size weight to use is shown by a scale.

Silver King Jacks

A complete line of hydraulic jacks, the Silver King line, is offered by Simmons Mfg. Co., Ashland, Ohio. Ranging in capacity from the 2-ton floor jack model to the 7-ton bus jack with a double ram, the jacks offer several outstanding features. All parts are machined to close tolerances, and guides at top and bottom of the ram distribute the load more evenly. The body, base and carrying handle are of one piece malleable iron, and use the pyramid type of design. A strong, 2-piece pumping handle is furnished with each jack.

Bench Model Brake Drum Lathe

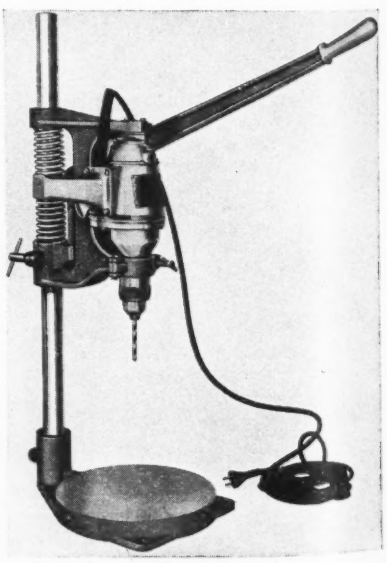
Lempco Products, Inc., Bedford, Ohio, announces the introduction of a bench model brake drum lathe especially designed for the small dealer whose volume of this type of work does not justify an investment in heavy equipment. The new model will



handle the largest and smallest passenger car drums, complete with tires and wheels. A wide variety of self-centering cones and special adapters are included as standard equipment, and optional equipment is available to handle brake drums riveted to axle shaft flanges and drums which are demountable from axle shafts and which must be trued without hub support. Complete information and prices will be supplied by the manufacturer.

Signal Has New Bench Stand

A bench stand that with the Signal OB-5, ½ in. drill, can be converted easily and quickly into a practical and convenient stationary drill press is announced by Signal Electric Mfg. Co., Menominee, Mich. This stand,



illustrated here, is designated as DS-5 Bench Drill Stand. It is substantially made, 32⅜ in. high above base that is 11 in. in diameter, with a 1½ in. diameter column.

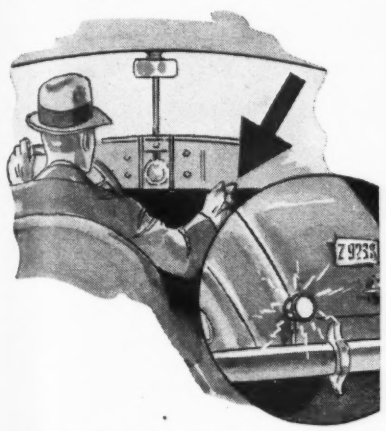
Bear Has New Model Wheel Balancer

The Bear Mfg. Co., Rock Island, Ill., has announced a new streamlined model of its Bear Dynamic-Static Wheel Balancer. Many mechanical improvements have been made, it is claimed, as well as an entirely new appearance. The new unit is reported to sell at a lower price than the previous outfit. It includes a complete set of tools with attachments for all

passenger front and rear wheels, and also a combination steel stand with compartments for keeping the balancing weights and a shelf to hold all required balancing tools. The unit itself retains the Neon Eye principle of detecting and proving unbalanced wheel conditions.

Back-Up Light Rings

The Federal Back-Up Signal Co., New Center Building, Second Blvd., Detroit, Mich., has introduced a new safety device for all motorists. It consists of a bell and light, mounted on the rear of the car as a back-up light. Control is provided by a con-



veniently located switch on the instrument panel. Turning on the switch starts the bell ringing and also turns on the light, illuminating the area to the rear of the car. Complete information and prices may be obtained by writing the manufacturer.

Government Job Wanted

There's a chap out in Evansville, Ind., who wants to work for the government. In fact, he wants the job so badly he has offered the government his entire business establishment for five years and his personal services also—in exchange for his tax bill.

He is Harry Lang, of Harry Lang, Inc., an organization which consists of gasoline filling stations, floor wax plant, and some other local enterprises. Lang called in an auditor to make out his tax returns, recently, and discovered to his chagrin that his 1938 tax bill was greater than capitalization and equivalent to about 20 per cent of gross.

When he studied the taxes on his filling stations, the results got him down. For a gross profit of $250, taxes came to $400! Yet the state and federal gasoline taxes were only the heaviest among gross income, corporation, capital stock, net income, chain store, truck, encumbrance, and other levies.

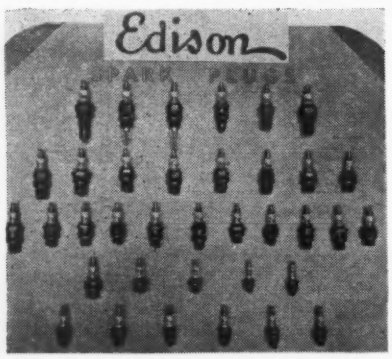
So President Lang wrote Washington, D. C., and made his proposition —government to take over the business, pay him the taxes for the next five years as his salary. He's awaiting a reply!

Altoona Listed for Two Races

The Altoona (Pa.) Speedway, scene of the nation's most thrilling board track battles of a few years back, is tentatively listed for two races on its one-and-one-eighth mile dirt track in 1939. The dates suggested are May 30 and Labor Day. The fall date was an annual event in the board speedway era.

Edison Has New Spark Plug Line

Edison-Splitdorf Corp., West Orange, N. J., has developed a new single line of Edison spark plugs which will replace the two separate lines known as the one-piece and two-



piece lines, which have previously been built by the company. The new plugs are designed to meet present-day rquirements of high compression and intensified thermal conditions, and to give long life. The new line of plugs is supplemented by the present HC-high compression line for unusual conditions where high sustained speeds and extremely high temperatures require a specially designed spark plug.

Battery Post Shim

A new shim for battery posts on any model car, so that worn battery clamps fit tight and give a sure contact, is announced by Champ-Items, Inc., 6191 Maple Ave., St. Louis, Mo. Known as No. 956 Lead Battery Shim,

it is claimed that the shim works equally well on either positive or negative posts. Easy to install—merely loosen battery clamp, slip the shim over the post and tighten the clamp.

A Selling Point for Wheel Service

Front wheel misalignment is costing American motorists in excess of $100,000,000 annually in needless tire wear. Loss in mileage is equivalent to a trip across the continent for every car in the United States, Colonel Charles E. Speaks, president of the Fisk Tire Co., estimates.

To combat this tremendous loss, Colonel Speaks advocates that motorists immediately adopt a plan for tire inspection by a tire expert every 2,500 miles. Misalignment, he explained, becomes evident in irregular and excessive tread wear before it is recognized through mechanical troubles.

It costs the individual car owner 15 per cent of his investment for front tires, or about $3.60, and 3,000 miles of unnecessary wear per year, Colonel Speaks declared.

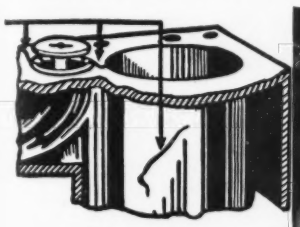
"A mere five-minute examination offers vital protection against driving with brake drums out of round, with excessive caster, camber, or toe-in action, as well as with improper alignment. First symptoms of all these troubles are undue tire wear. Regular inspection, therefore, protects the motorist against both wasted tire mileage and the development of serious mechanical troubles, which may cause accidents."

Synthetic Tires

Rubber companies now are experimenting with tires made from synthetic rubber manufactured from petroleum gases. The cost of the synthetic rubber is estimated at only one-third to one-half the 45c to 50c per pound cost at which German firms are making synthetic rubber from coal. Russia is said to have produced 400,000 tires from synthetic rubber in 1938.

WONDER-WELD . . .

WHEN THIS HAPPENS **DO THIS** ***seals engine cracks — permanently***



FOR VALVE PORTS AND INSIDE CYLINDER CRACKS

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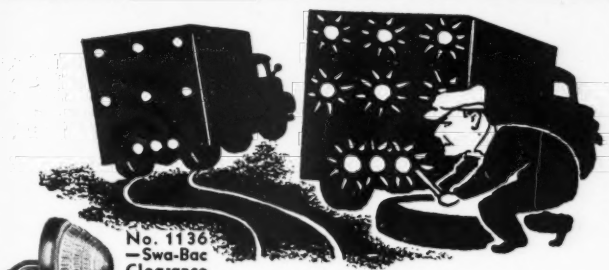
Rely on Wonder-Weld. Every drop works. That's the real difference in Wonder-Weld. A scientific combination of three liquids and five solids, Wonder-Weld repairs permanently any water leak due to inside engine cracks, cracked valve ports, water jackets, aluminum heads, etc. Use genuine Wonder-Weld for Guranteed Results. Look for its orange and black container. See your jobber, or write

MILLER MFG. CO.
1218 Kaighn Ave., Camden, N. J.

BEWARE OF IMITATIONS

IF IT "SAVES HIS LIFE" ONLY ONCE —YOU'LL BE GLAD YOU SOLD IT



No. 1136—Swa-Bac Clearance Lamp. Entire body made of rubber. List 50c.

No. 1173—Flush Type Clearance Lamp. Only 1⅛" in depth—yet gives maximum light. List 55c.

—But month after month these dependable clearance lamps will stay on duty and give full protection. Sturdy weather and vibration proof construction assures long life of bulb. Certified—easy to sell. Ask your jobber. Write for information.

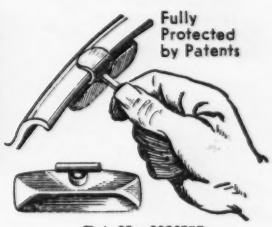
DO-RAY LAMP COMPANY
1458 S. Michigan Ave., Chicago, Ill.

Tested by Recognized Testing Laboratories Passing Specifications of S.A.E. and I.E.S. Meeting Requirements of I.C.C.

DO-RAY

CERTIFIED
SAFETY LIGHTING AND REFLECTING DEVICES

What Service Do Cars Need *Most* These Days?



Pat. No. 2036757

Wheel Balancing!

Wheels that are out of balance cause shimmy, tramp and excessive tire wear. Call these facts to the attention of your customers and you'll secure many an extra service job. It costs little to equip your shop to balance wheels. Write for full information.

WRITE for CIRCULAR

HARLEY C. LONEY CO.
16891 Wyoming **Detroit, Mich.**

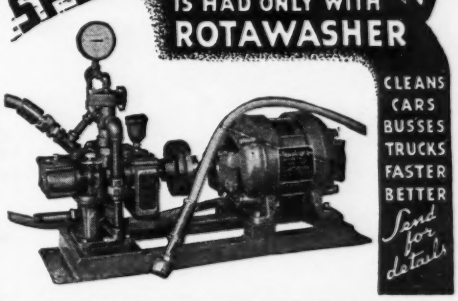
L & H Wheel Balancing Weights

More Washing Profits with . . .

● Net more profit per job—do it better, quicker and with less labor the modern Rotawasher way.

● Ideal also for cleaning motors, parts, garage floors, chamois, etc.

We'll tell you how —write!



The Rotawasher Corp., 126 East St. Clair Ave., Cleveland, Ohio

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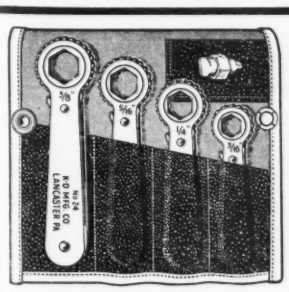


New!

K-D No. 20

RATCHET WRENCH SET

3/8" - 5/16" - ¼" - 3/16" . . . Reversible ratchet . . . No heads to change . . . Offset screwdriver bit . . . Pocket size leatherette roll . . . only $2.75 LIST.

Ask your Jobber for Dealers' Net Prices

K-D MFG. CO. LANCASTER, PA.

HYDRAULIC BRAKE FLUID —one item from this remarkable line. Made of the highest grade vegetable oils. Mixes with any quality brake fluid. Containers sealed for customer protection. The choice of thousands of satisfied users.

A LINE VOUCHED FOR BY THOUSANDS OF USERS

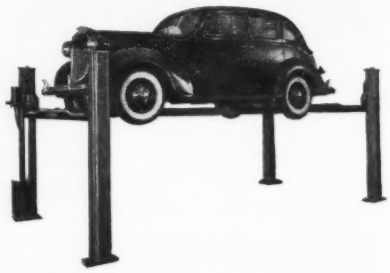
Flare

A COMPLETE AUTOMOTIVE CHEMICAL LINE

FLARE (formerly Flash) LABORATORIES 1858 West Kinzie Street CHICAGO, ILLINOIS

Four-Post Electric Lift

The Curtis Pneumatic Machinery Co., Kienlen Ave., St. Louis, Mo., has announced a new four-post electric lift which has no cross beams, chains or other overhead obstructions. A car can be driven on or off either end. No excavation, special foundation or even floor sockets are needed to set



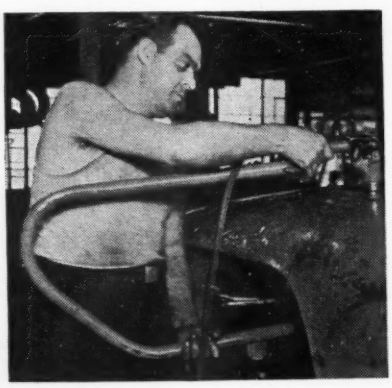
up this lift on any type of wood, composition or concrete floor, it is claimed. Automatic, double safety features at each corner of the platform are provided, instantly stopping all four corners when an emergency occurs, and in addition, the platform is locked by means of automatic safety dogs. The lift is supplied with either free-wheel or roll-on platforms. For complete information and prices, write the manufacturer.

Tap-Reamer Set

Rinck-McIlwaine, Inc., announces the new Rimac Spark Plug Tap Reamer Set No. 7. This outfit is said to prepare the repairman for any and all forms of difficulties with spark plug openings. A special feature of the outfit is the guide, for reamers and taps, which is said to insure a perfectly aligned job. The long T handle holder fits all four taps and all three reamers in the set. Price for the set, net to dealer, is $7.85. Any part of the set may be bought separately.

Air Hammer for Body and Fender Work

Ingersoll-Rand Co., 11 Broadway, New York City, has announced a new pneumatic air hammer with three sizes of yokes to make it adaptable for metal straightening work on fenders, door panels and turret tops. Dollies and dies are furnished for



sharp, medium and slight curves, body corners and flat surfaces. The tool is light in weight and easily handled. Power adjusting valve permits regulating power as needed and according to air pressure available. For complete information and prices, write the manufacturer.

Portable Drills and Sander Added to Mall's Line

In addition to their complete line of flexible shaft machines for grinding, sanding buffing, polishing, filing and drilling, the Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill., has added a complete line of portable electric drills and portable electric sanders. These new tools, as well as the flexible shaft machines, are described in a new catalog just off the press.

Old Stuff

The idea of the automobile is ancient! It dates back to the 15th century according to the American Petroleum Institute. The scientists in Leonardo da Vinci's time didn't quite visualize the streamlined family bus of today, but they toyed with the idea of mixing air and fuel, igniting the mixture in an engine, and using the power for driving machinery.

There were all kinds of ancient ideas about the internal combustion engine. In the 17th century a Dutch scientist, Christian Huyghens, proposed to manufacture a "gunpowder engine." It wasn't so good, but it renewed interest in the possibilities of the internal combustion engine.

In the 18th century people were agog over an engine which would run on coal gas. It was built by John Barber, an Englishman. Designs were improved, development was expedited, and the internal combustion engine manufacturing industry really was born. There were "double acting" engines which used the crankshaft, connecting rods and piston assembly about the same way that it is used in the modern internal combustion engine.

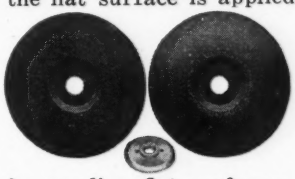
The German engine designer, Otto, adapted the principles of the first four-stroke-cycle theory advanced by the French scientist, Beau de Rochas. It became the forerunner of today's four-cycle automotive gasoline engine.

Delco Brake Fluid

The Delco Brake Division of General Motors announces a new and radically different chemically processed fluid for hydraulic brakes, called Delco Super 9 hydraulic brake fluid. It is claimed that this new fluid does not harm rubber or metal parts, has an extremely wide temperature range and mixes readily with other brake fluids. Delco Super 9 hydraulic brake fluid is merchandised in quantities from pints to five gallon cans, through United Motors Service and its distributors.

Flexible Sanding Pad

Announcement is made by The United States Electrical Tool Co., 2483 West 6th St., Cincinnati, Ohio, of a new three-in-one flexible rubber sanding pad. This is a moulded rubber pad which can be used for feather edging, flat sanding or leveling. There is only one holder for all three sizes, which fits any United States sander. The sanding pad is so formed that when the flat surface is applied it is



ideal for sanding flat surfaces; when it is turned over and the curved surfaces applied it is equally efficient for sanding curved surfaces and feather edging. The pad holder nut fits 5 in., 7 in., and 9 in. pads. The pad is of solid rubber without metal base which makes it very flexible and enables the user to get the utmost possible life out of the appliance.

Two-Speed Sander by Chicago Pneumatic

The Chicago Pneumatic Tool Co., 6 East 44th St., New York City, has developed a new 2-speed sander for 7 and 9 in. sanding. With this modern CP 2-speed sander, changing from

one sanding speed to the other is accomplished simply by a button in the switch handle—there are two buttons, each plainly marked for low or high speed.

Fuel Oil Filter

The American Bosch Corp., Springfield, Mass., announces that it is now in production on a new fuel oil filter, intended for use as the final filtering unit in the fuel oil system that is required on Diesel engines to remove foreign matter which seems to find its way into the fuel oil, either from storage or from handling.

It is claimed that the remarkable filtering efficiency of this filter insures the removal of the finest dirt particles that are harmful to the fuel injection system. By its use the finely-lapped parts such as injection pump plungers with barrels, discharge valves and the spray nozzles are protected from the destructive abrasive effects of the fine dirt particles which have been removed.

Alemite Has New Equipment

Three new lines of Alemite automotive lubricating equipment have been introduced by the Alemite Division of Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, Ill. They are designated as DeLuxe, Advance and Utility, and are intended to enable any class of service operator to acquire uniformly styled equipment within a certain price range. The DeLuxe line is designed for super-service stations and large car dealers, the advance line is for smaller establishments whose volume of business warrants power-operated equipment, while the Utility line is offered for operators whose requirements can be met with modern, hand-powered guns and pumps.

CLASSIFIED ADVERTISEMENT

Live Storage That's Really Alive

(*Continued from page* 17)

grades of batteries, and also a stock of tires. Thus, when serving the customer with canned oil we can attract his attention to a battery or tire, and it is not unusual to make an extra sale which runs into many dollars.

"We consider the cost of making the metal display fixture a good investment. We consider this a more impressive way of displaying the items than by piling them on floor or tables. One of its practical advantages is that the batteries can be fastened to the rack, to prevent pilfering which might occur at night, when the night man leaves the main floor to take a car up the ramp.

"We not only carry a large stock of accessories, but we display them at strategic points where we can easily suggest them to owners coming in for gas, oil and greasing services. Thus, we built a display case as a unit of the gas pump equipment, where we show a miscellaneous assortment of accessories, such as lights, polishes, flashlight batteries and other pick-up items which every car owner can use.

"We installed another display case right alongside the greasing lift. In this case we show mainly radiator cleaning compounds and such other items as radiator couplers. The reason for placing this display near the greasing lift is that frequently owners stand around to watch the work and they can then become interested in the items. With the hood of the car off, the grease man can point out the need of a new coupler. Furthermore, we display our stock of fan belts at this point, these being hung conveniently on an overhead rack. This display makes it easier to suggest a new fan belt to the waiting car owner, and the grease man can make a replacement without leaving his work.

"We also maintain an accessories display at the front office. This is the most important display position, as the office is located at the foot of the ramp, and at the same time it is accessible to customers bringing in their cars for oil, grease and mechanical service. The office has been entirely enclosed with glass display cases, with one opening which serves as the cashier window. Atop of the office we have installed a case where we show batteries, with room also to display a tire and other items. Many of the items thus displayed are afterthought items, such as flashlights, polishes, coils and many other items which can be easily suggested to the customer at the time that he pays his bill for storage or service.

"We always try to have three men stationed in the front of the garage, so as to give the proper kind of accommodation to the customer. When a customer drives up for gas one man handles the pump, while another, and sometimes two other men, get busy wiping the windshield, filling the radiator, and even wiping off the hood. Besides, with three men constantly on service someone is always available to take care of accessory sales.

Those Growing Midgets

Added to the midget race tracks currently operating from the East to the West coast are: Chicago, Ill., Miami, Fla., and New York City.

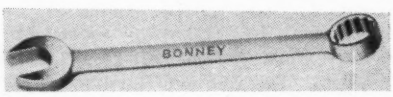
At Chicago, a program is being run each Sunday night at the Chicago Armory. The schedule on the indoor board track opened January 8.

Miami is offering its vest-pocket thrills at the Fun Park Speedway each Tuesday, Friday and Sunday nights and Sunday afternoon. The fifth-mile hard-surfaced course was thrown open January 17.

The New York Coliseum on East 177th Street in the Bronx opened its twice-weekly card January 8 on a semi-banked board track. Programs are being staged Wednesday evenings and Sunday afternoons.

TuType Wrenches by Bonney

Supplementing the line of TuType wrenches announced by Bonney Forge & Tool Works, Allentown, Pa., a few years ago, a new line has been announced with openings ranging from



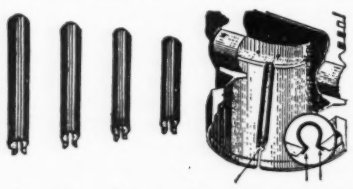
⅜ in. to 1 7-16 in. Combining an open-end and box wrench, each with the same size opening in a single tool, the advantages of this type of tool are readily apparent.

Waterproof Dimmer Switch

Standard Motor Products, Inc., 37-18 Northern Blvd., Long Island City, N. Y., makers of "Standard" and "Blue Streak" ignition parts and battery cables, announce a new type of dimmer switch which is said to be entirely waterproof. The new "Blue Streak" dimmer switch uses a one-piece die cast structure with an impregnated gasket between the body and a moulded bakelite non-absorptive face plate, hermetically sealing the unit. A two-piece terminal is used in place of the conventional snap-in terminal, insuring a permanently tight connection. For complete information and prices, write the manufacturer.

Haling Piston Expander

The Haling Piston Ring Co., 1061 Second Ave., S. E., Rochester, Minn., has developed a piston expander which attaches in the split of the skirt, and is claimed to expand skirt



evenly for its entire length. Expanders are furnished in lengths of 1½ in., 1¾ in., 2⅛ in., and 2⅜ in. It is claimed that this expander permits flexibility of the skirt so that it will conform to cylinder wall taper.